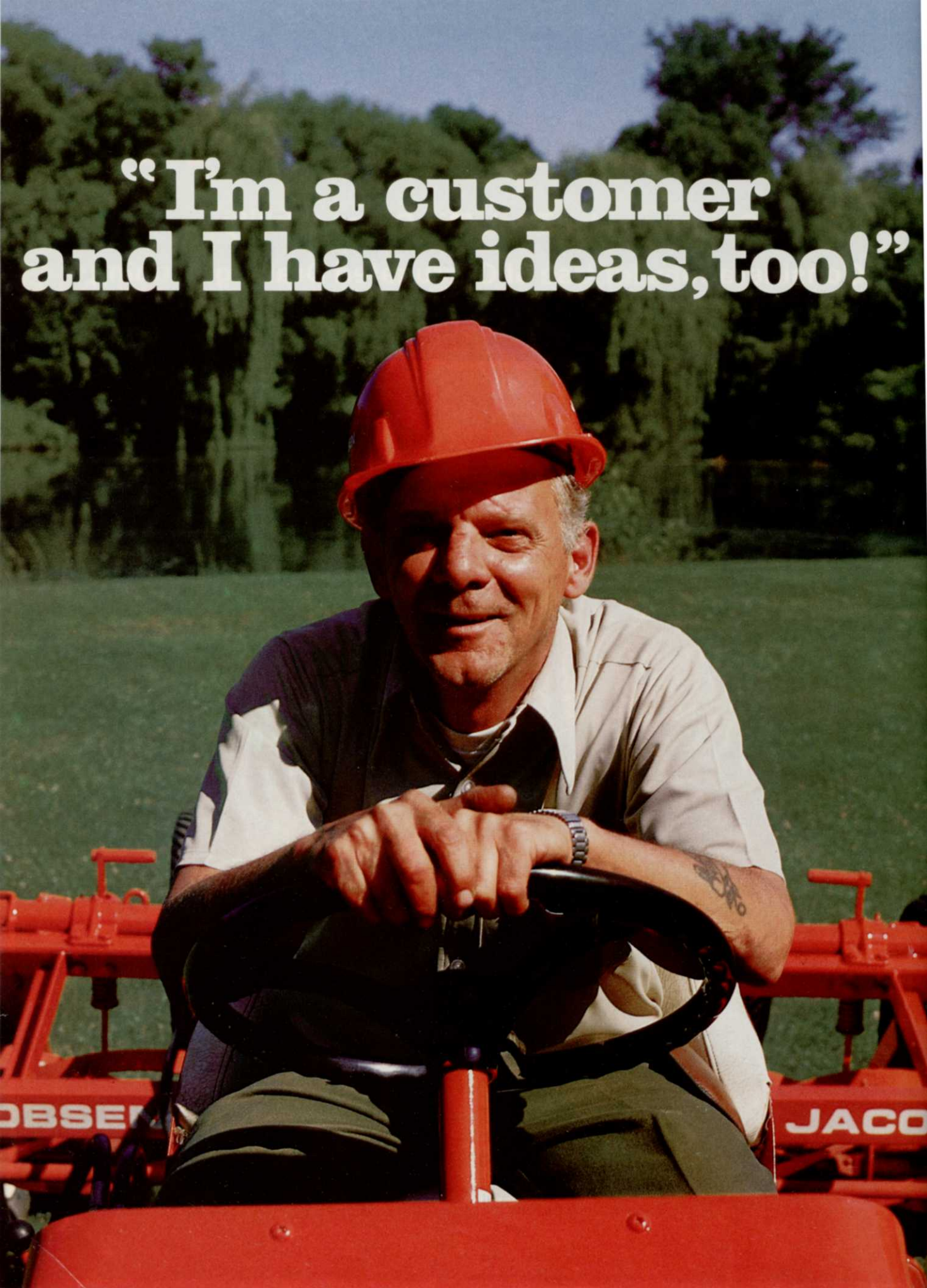
The Business Journal of Vegetation Management March 1979/$1.25

WEEDS TREES & TURF

Guidelines for Tank Mix Compatibility

Considerations for Use of Corrugated Drainage Tubing

Characteristics of Preemergent Herbicides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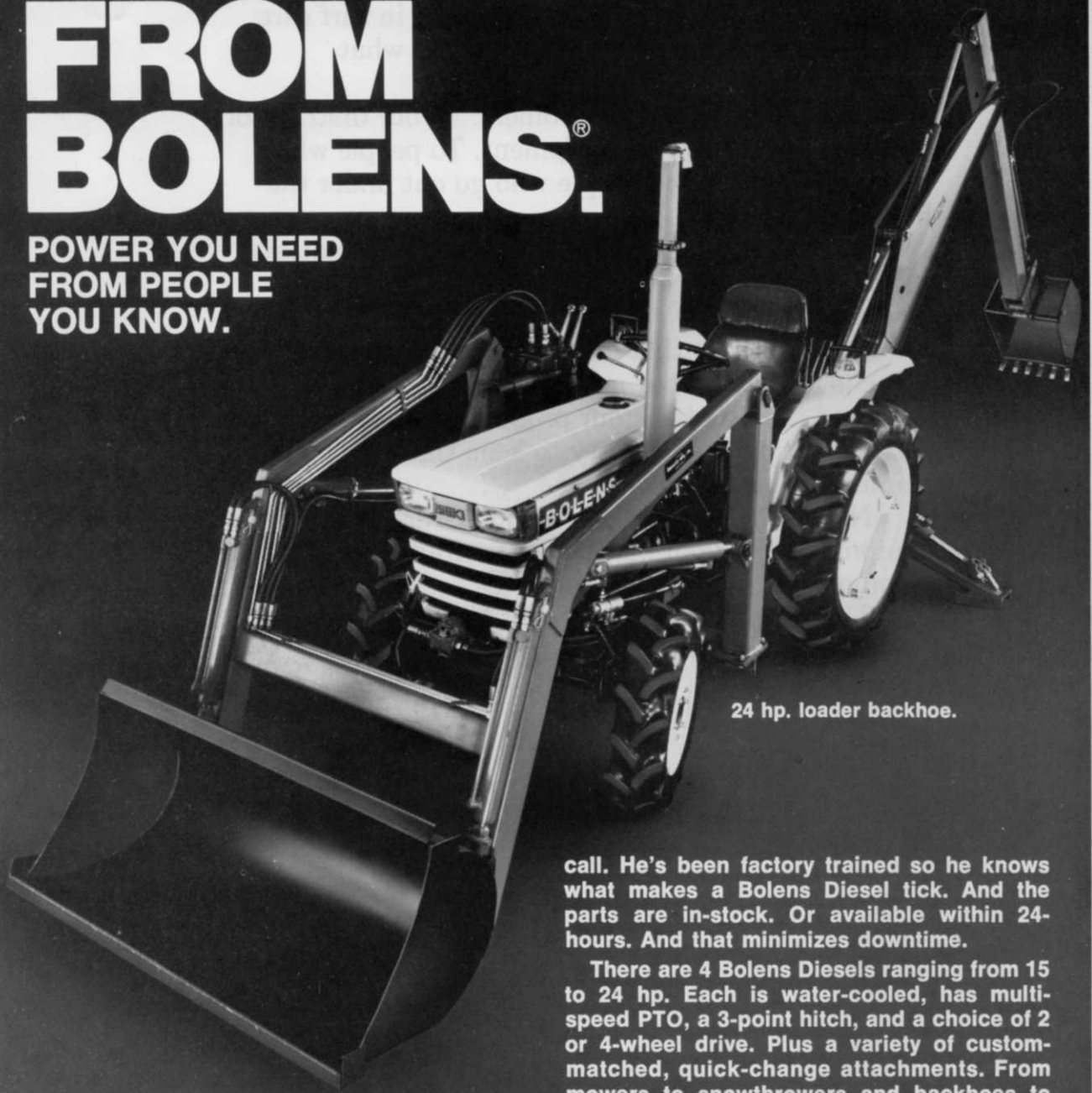

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FMC

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WT&T

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Cover: Photo courtesy of Lake City Community College in Florida.

LETTERS

Parks face political problems

I wish to comment on the article in January's publication of "Park Maintenance Begins With Design."

"YOU GET WHAT YOU PAY FOR"
is an old saying that I feel needs to be added to Professor Haskell's article in January's WEEDS, TREES & TURF.

During a portion of my professional career, while employed by consulting firms and self-employed, I have worked for and consulted with public agencies. Some agencies I dealt with employed under-qualified and unknowledgeable personnel who were responsible for giving important design criteria information to consultants. The agencies probably saved money in salaries, but ended up with a poorly designed project which was considerably over budget.

It seems some agencies hired consultants for political reasons, or hired consultants who would do the work for the least amount of compensation; again, this would promote poor design.

If public agencies are sincere about their project being competently designed, as Professor Haskell points out in his article, the agencies might start by hiring qualified personnel who in turn know good design from poor design, who are not placed in the position of retaining consultants for political reasons, and who have the background of experience to insure that the consultants do what is best for the agency — not what is best for the consultant.

"YOU PAY FOR WHAT YOU GET" both in professional "In-House" employees and consultants. You pay one way or the other.

John W. Davidson, ASLA
Landscape Architect
San Diego Unified School

Message to landscapers

At best, a landscaper is a farmer at heart, working with soil and nature, toiling nine or ten months of the year, working some twelve to fifteen hours a day, using much the same equipment. The main exception is that the landscaper has many more unknown factors to consider. Plant material availability is becoming a serious problem and, after locating and planting same, is subjected to damage by all extreme elements of the weather. One exception to the farmer is that much of the work has to be performed by hand using shovels and small hand tools. The landscaper has to have an intricate knowledge of plants, growing habits, soil conditions, diseases, and plant growing requirements. Quality of plant material varies and vigilant expertise has to be practiced at all times.

The landscaper assumes a great responsibility when he estimates a landscape project. In most instances he calculates that "normal" or "average" weather conditions will prevail during the growing period for the plants. This fallacy has cost much money in plant replacement.

In many respects a landscaper is much like a doctor . . . A doctor works on human birth, growth, illnesses and injury, and the degeneration of the body which is comparable to the nurseryman or landscaper who works with live plants. Plant propagation, early growth and care, plus threats from weather conditions, diseases, injury, insect devastation, ground composition, location, and changing conditions as to shade and water levels, constitute a formidable problem and challenge for the estimater. The landscaper takes on a tremendous responsibility in making his designs and plantings and, in most cases, assumes and hopes that everything will be favorable for his plant material to survive and properly grow according to the landscape plan. Unexpected weather conditions quickly change this possibility.

For the responsibility entailed in the foregoing paragraphs, it seems idiotic for a landscaper to charge or estimate low rates just for the sake of getting the job. Forgetting to include an adequate amount to compensate sufficiently for the expertise is non-professional. Not considering all expenses and costs and working for a wage much below a "sanitary engineer" or sweeper in a factory, with no vacations, medical benefits, or certainty of work, is also non-professional.

If we consider ourselves to be professionals and want to up-grade our industry, then let us start by doing professional work, start paying adequate wages commensurate with associated industry, and start charging realistic rates to compensate us properly for our knowledge, expertise, and endeavors.

Ohio Landscapers Association
Stanley M. Lucas
Publicity Chairman

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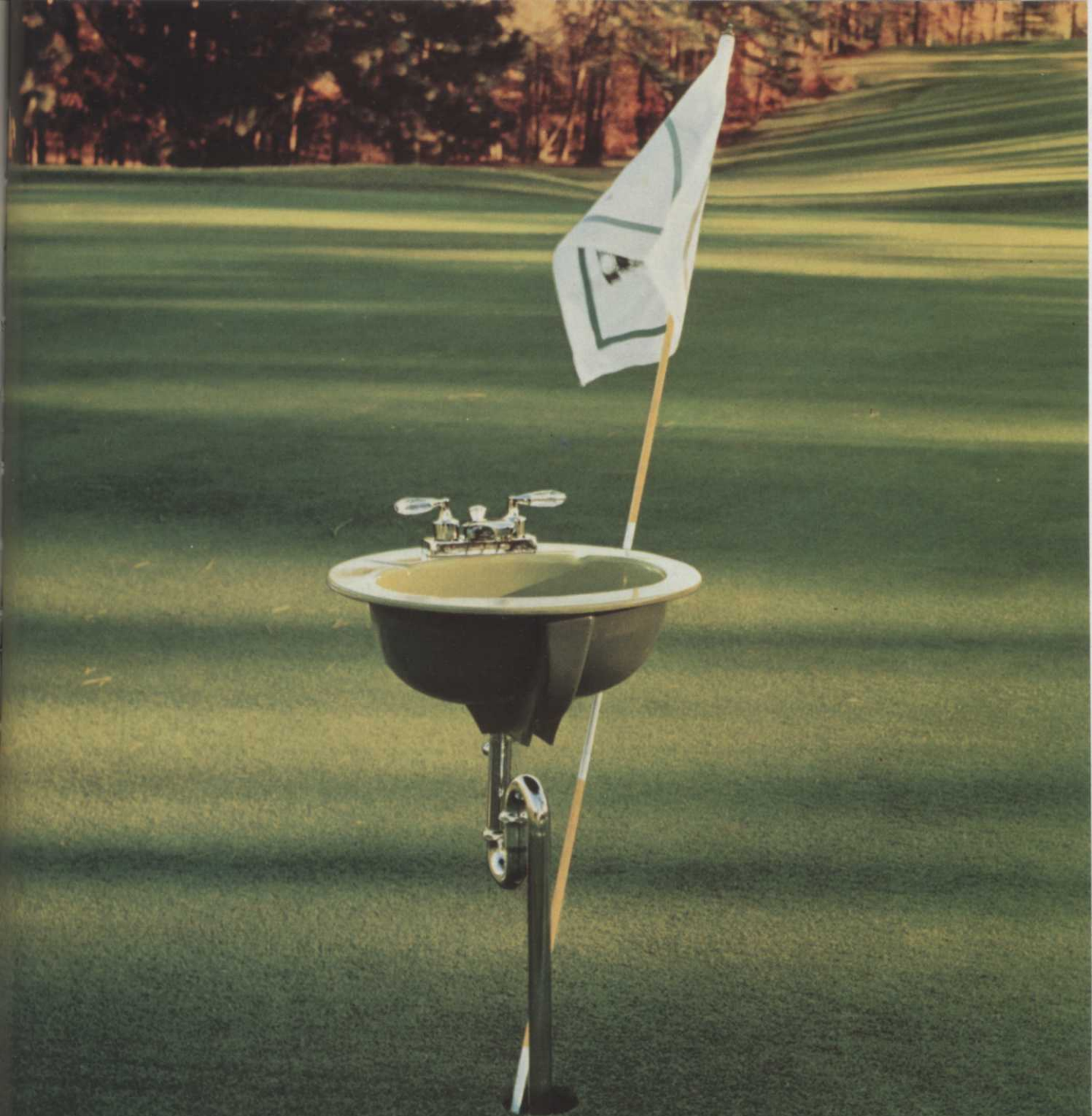

On the greens, the fairways...all around the links, inside the clubhouse and under all the sinks

DURSBAN 2E is the one insecticide that works. DURSBAN* 2E Insecticide is ideal for broad spectrum, multi-purpose insect control everywhere around the club. Outside, DURSBAN 2E gives you unsurpassed control of turf pests like chinch bugs, sod webworms and cutworms, plus ticks, chiggers and mosquitoes. It even wipes out bagworms and many other ornamental plant pests. Inside, it cleans up the toughest roach problems, and keeps working to rid your buildings and restaurant areas of insect pests. Ask your supplier about the one insecticide that really works, DURSBAN 2E. Just be sure to follow all the directions and precautions on the label. Agricultural Products Department, Midland, Michigan 48640.

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Mow smoothly and pick up clippings in one pass! The rugged, versatile Lawn Genie thatches lawns, verti-cuts greens, tees and fairways, sweeps leaves, wades through high weeds and empties easily from the tractor. It's the pick-up mower that cleans, mows and sweeps.

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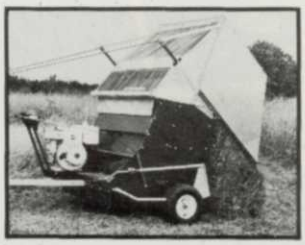

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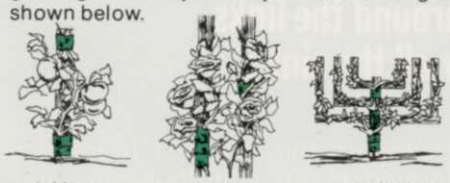
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VIEWPOINT

Bruce Shank, Editor

Every man and woman lives with the hope that each day's labor is a significant contribution to his profession and that years later those contributions will be recognized by family and associates. Without the feelings of worth and recognition man is incomplete.

The Green Industry, basically a second or third generation industry, falls short on recognition of its members when they step aside for the next generation. For the most part, commercial growth has taken place in golf, landscaping, tree maintenance, memorial park, and weed control since 1920. Those persons in their seventies started us on our way.

The Green Industry needs its own Hall of Fame, something of national scope based upon input from regional associations. In my opinion, such a collection of notables, should come from all segments of the Green Industry.

Trying to get cooperation from all groups within the Green Industry has been fairly difficult so far. The American Council for Turfgrass, formerly known as the National Turfgrass Federation, has not received the support needed to get off the ground, after two years of trying.

But what better reason to join together than to honor our best? How much disagreement could there be about the need to recognize persons who made our occupations what they are today?

Another indication that the Green Industry hasn't organized its methods of recognition, is the tough time our foundations are having getting the financial base necessary to support industry projects and research.

Foundations make alot of sense. Through trusts a person can put otherwise lost estate taxes to work for the industry which supported him during his working life. There is nothing greedy or un-American about controlling the direction of your estate after death. I'll bet every senator and congressman has a trust fund.

Combine the need for recognition with industry support of research and development through trusts and you have one smart solution to both problems.

The younger generations can strive to be recognized as their predecessors were with the aid of new information derived through research supported by trusts and memorials.

I am currently aware of two foundations in this industry, the Musser and the Noer Foundations. If you would like more information about these foundations or think the Hall of Fame idea is sensible, let me hear from you.

We've got to do more to show our predecessors our gratitude. History is the foundation of every endeavor. It is the common link for the entire Green Industry. Honoring our predecessors has the effect of strengthening our foundation, giving all of us a sense of unity and worth.

It's time to quit thinking about patting our early leaders on the back, and do it. **WTT**

THE LITTLE TRACTOR THAT CUTS ANY WAY YOU LIKE IT.

At John Deere, we call the 850 and 950 our "little-big" tractors.

Because even though they're smaller and less expensive to buy and operate than many other tractors being used for parks, golf courses and other large-acreage mowing jobs, they've proven that they're more than big enough for the job. The 22-PTO-hp 850 and the 27-PTO-hp 950 have all the power you need to handle just about any kind of attachment. And both have versatile 8-speed transmissions that fit a wide range of jobs.

We offer 4 different mowing attachments alone: rear-mounted rotary cutter, flail mower, sickle-bar mower and center-mounted rotary mower.

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GIVE MALLINCKRODT YOUR FUNGUS, WEEDS AND ROT, YOUR BROWN AND BARREN TURF.

GET MEAN ABOUT GREEN WITH MALLINCKRODT'S VERSATILE TURF LINE.

Green is what you want—from tee to green.

Mallinckrodt's line of proven turf products has the proven way to get it.

Whether you want broad spectrum control, or the solution to a specific problem, get tough about it with the just-right answer...

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JERSEY CITY
LOS ANGELES

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GREEN INDUSTRY NEWS

NURSERY

National marketing plan to have spring test

The Nursery Marketing Council has announced plans to begin testing its proposed national advertising campaign in specific markets this spring. According to Richard Hutton, chairman of NMC's Steering Committee, the marketing plan was developed by Ketchum, MacLeod & Grove, NMC's agency, in three initial steps.

"First, the creative team at KM&G took our original selling concept — *'A nice looking yard enhances the value of my property'* — and translated it into actual advertising," explains Hutton. "Secondly, the media team established the most efficient ways to deliver that message to the largest number of our most likely prospective customers in the U.S. and Canada. And, finally, the research team devised ways all this can be tested to see what works best, and how the best efforts can be made to work even better."

Based on the sales message to be delivered and the anticipated budget available, the agency has advised NMC the wisest choice for advertising medium is radio. "We're talking about a 'nice looking yard'," says Hutton. "If we try to show a picture of a nice looking yard in newspapers or magazines or on television, the one that will be right for one part of the country won't be right in another.

"But if we talk about a nice looking yard, every listener can visualize his own ideal in the 'theater of the mind.' And not only that," says Hutton, "the listeners can picture who will do the things necessary — someone in the family, a landscape firm, whoever. And picture where those purchases will be made — nursery, garden center, mailorder, wherever."

The media team at KM&G has developed a sophisticated procedure to schedule NMC radio advertising once the campaign is in a fully operational year. The advertising has the potential of reaching everybody, but it is specifically targeted to single-dwelling homeowners aged 25 to 54, with a household income of $15,000 and above, and at least a high school education. This target audience was deemed to be the most likely to increase their purchases of living plants, related products and services.

The advertising for the first going year will be concentrated in the period March through May. In order to get the greatest frequency, the advertising will be aired in two five- or six-week schedules during that time. According to accepted broadcast statistics, NMC's advertising is expected to reach over 75% of its target audience. Fifty-nine percent of the nursery industry's top prospects will hear the message two or more times in any given five or six week schedule; 38 percent will hear it six or more times in the same period.

In order to insure that the creative approach is accurate and that the media plan will be effective, the campaign will be "tested" before going national (international, including Canada).

Before actual testing begins, however, the Nursery Marketing Council's advertising concept and actual radio commercials will be "pretested." All through the month of February in two cities — Atlanta and Pittsburgh — a number of focus groups will be convened to hear the NMC radio spots. Each will be made up of owners of single-family detached dwellings; half will be male, half female. After each commercial has been played, the listeners will answer a long and detailed questionnaire devised to learn just what and how much they got from the advertising, and all the subtle feelings they may have about it.

"We already know we have the strongest possible selling concept — 'a nice looking yard enhances the value of my property' —" says NMC spokesman Hutton. "Our nine months of research last year told us that. But now we will know if our advertising expresses that concept properly. If it sells. We will know what is strongest in our commercials. What is weakest. What to do to make them better."

Full details on the Nursery Marketing Council, the research which has been accomplished, the marketing plans, funding, etc., may be obtained by writing NMC, 230 Southern Building, Washington, DC 20005.

TREES

USDA funds study of elm diseases

Jay Stipes, a professor of plant pathology at the Virginia Polytechnical Institute and State University, Blacksburg, Va., has been awarded a $69,500 grant from the United States Department of Agriculture to prepare and publish a "Compendium of Elm Diseases."

Working with him as co-editor will be Richard Campana, a professor of forest pathology at the University of Maine, Orono, Maine. Contributions from plant pathologists in Europe and North America will also be included.

The compendium will contain an evaluation of all known diseases of

elms and certain diseases of other trees in the elm family.

Stipes has specialized in Dutch Elm disease research in the Midwest and South for 16 years and is best known for his work in chemotherapy for disease control.

Campana has specialized in Dutch Elm disease research in the Midwest, Northeast, and California for 27 years and is best known for his work regarding development and control of diseases in urban elms.

TURF

Southern California institute set for April

The Southern California Turfgrass Council recently announced the dates and locations of the 1979 Spring Turf & Landscape Institute and the annual Turfgrass/Landscape Equipment & Materials Educational Exposition.

The institute, co-sponsored by the council and the University of California Cooperative Extension, will be held April 18 and 19 at the Anaheim Convention Center. The theme of the show is "Economics and Maintenance."

Cost for two-day registration which will include institute attendance, two luncheons, and an evening banquet is $37 per person. Basic registration (no meals) is $15 and student fee is $5.

Registration information can be obtained from Ed McNeill, 1000 Concha St., Altadena, Calif. 91001 or call (213) 798-1715.

The educational exposition, also sponsored by the council, will be held October 17 and 18 at the Orange County Fairgrounds in Costa Mesa, Calif.

EROSION CONTROL

National laboratory set for Purdue site

Construction of a $3.6 million National Soil Erosion Laboratory at Purdue University, West Lafayette, Ind., should be underway by next summer, according to a U.S. Department of Agriculture spokesman.

Earl R. Glover, acting regional administrator for agricultural research of the department's Science and Education Administration (SEA), said the laboratory should be ready for occupancy by late 1980 or early 1981.

Construction funds were included in the agricultural appropriations bill approved by Congress and signed by President Carter in October.

The two-story building will provide space for about 15 SEA agricultural research scientists and 22 staff personnel. "There also will be space for cooperating Purdue research and teaching staff as well as graduate students and visiting scientists," Glover said. Building plans are currently in the preliminary design stage.

PARKS

Opryland is site of fall institute

The Ninth Annual National Institute on Park and Grounds Management will be held Oct. 28-Nov. 2 at the Opryland Hotel in Nashville, Tenn.

The institute is open to all park and grounds managers. Program topics will cover management, operations and maintenance, along with updates on technical information. Concurrent sessions are scheduled for both parks and campuses.

Scheduled for the same dates at the Opryland Hotel is the National Turf Management Conference, a national meeting for all non-golf turf managers.

Leading experts will present a variety of programs on all phases of turf at the conference. On-site tours of park and campus operations in the Nashville area will also be presented. For further information contact the National Institute, Box 1936, Appleton, WI 54913.

MANAGEMENT

Davey Tree announces 11 officer changes

The Davey Tree Expert Co. has announced that 11 changes in top management have been made, including the retirement of Alexander M. Smith as chairman of the board and chief executive officer at the company's Kent headquarters.

The company's board of directors recently approved the election of Martin L. Davey, Jr., former company president and vice chairman of the board, to chairman of the board, Jack W. Joy, president and chief operating officer, to president and chief executive officer, and Howard L. Eckel, Jr., vice president of utility services, to senior vice president of operations.

Others elected include Dr. Roger C. Funk, from director of research and development, to vice president of research and development and Donald J. Shope, from sales manager, tree care services, to vice president of tree care services. Although Smith will retire he will continue as a member of the board of directors.

Those named to additional vice presidential positions include James H. Pohl, senior vice president, to executive vice president, Bert D. Stamp, vice president of field services, to senior vice president of field services, Ted A. Baer, from vice president of tree care services, to vice president and assistant to the president, R. Douglas Cowan, from controller, to vice president of finance, and William F. Heim, from utility sales manager, to vice president of utility services.

Continues on page 14

New Davey Tree Vice-Presidents (left to right) Donald Shope, tree care services; Howard Eckel Jr., operations; and Roger Funk, research and development.

VERSATILITY

JUST ONE OF THE REASONS BROUWER OUTSELLS ITS COMPETITION 8 TO 1

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- SIMPLE, ADJUSTABLE CUT-OFF produces consistently clean, square cuts.
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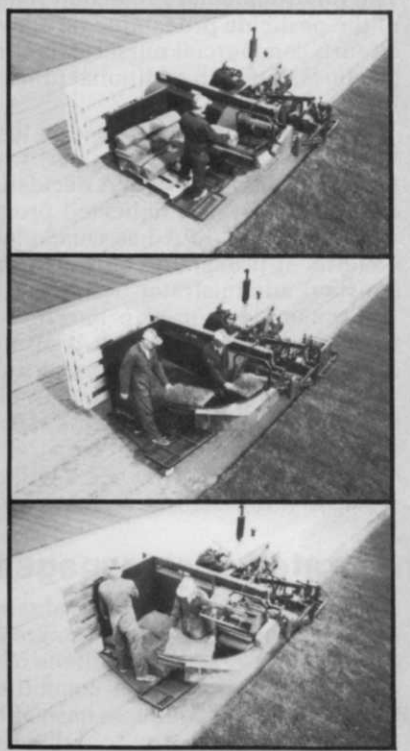
- SIMPLE DESIGN using STANDARD FARM TRACTOR and PARTS provides reduced maintenance costs, down time, obsolescence and depreciation.



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THE ULTIMATE IN RELIABILITY, VERSATILITY & ECONOMY

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GOVERNMENT UPDATE

Pronamide benefits exceed risks

The Environmental Protection Agency EPA) has proposed that uses of the pesticide pronamide be allowed to continue as currently used on turf, commercial nursery plantings, and a number of agricultural products, but with additional precautions to reduce potential risks to human health.

Pronamide has been used in the United States since 1969 under the trade name KERB, primarily manufactured by Rohm & Haas, Philadelphia, Pa. The EPA decided to review the safety of the pesticide after research indicated pronamide caused cancer in mice.

"In general, EPA has concluded that for all uses the economic benefits of pronamide outweigh its risks," Steven D. Jellinek, EPA assistant administrator, said.

Pronamide is used primarily to control weeds which compete with lettuce and alfalfa. It is also used to a lesser extent for weed control in turf and commercial nursery plantings.

EPA's proposal is not a final action. The proposal will be reviewed by EPA's Scientific Advisory Panel, the Department of Agriculture, pronamide registrants, environmental groups, and other interested parties. EPA will consider their comments in making a final decision.

Integrated pest management ten years away

A committee formed to evaluate steps toward integrated pest management will report to Congress that such measures will require considerable research, millions of dollars, and at least ten years.

The chairman of the committee, Auburn University's Dennis Rouse, said an inadequate base of information on pests and agricultural products, no way to deliver such information, and a lack of participation by manufacturers in integrated pest management research, have contributed to the committees findings.

Rouse and his group recommended doubling the current support for research on IPM at land-grant colleges and encouragement of further research by the extension service and other organizations. The cost of such a plan was estimated at $150 million.

NURSERY

Disease of carnations causes emergency ban

A virus disease which attacks carnations has been discovered for the first time in the United States in Colorado and California and may spread further, according to a United States Department of Agriculture spokesman.

The virus, carnation necrotic fleck, was previously know to exist in Japan, Israel, and Italy. An emergency ban on carnation shipments has been placed on two known infected commercial greenhouses near Denver, Colo. and near Salinas, Calif., according to James O. Lee, deputy administrator of USDA's Animal and Plant Health Inspection Service. The ban covers only infected carnations used for propogation and not cut flowers.

Officials in major carnation-growing states are surveying how extensively the disease has spread, but it will take considerable time to determine the extent of the outbreak because each sample must be identified individually with an electron microscope.

Disease symptoms include grayish white spots on leaves during the initial stages of infection and a reddish/purple discoloration of the leaves as the disease worsens. Some infected plants may show no visible symptoms, but act as carriers that help spread the disease.

The infection can be spread by cuttings made for propogation and by the green peach aphid, a common greenhouse pest.

FERTILIZER

Grace buys Peters, expands nutrient line

W. R. Grace & Co. has purchased, for an undisclosed price, the Robert B. Peters Co., of Allentown, Pa., manufacturers of pre-mixed, water-soluble nutrients for professional growers.

Operations will continue under the supervision of Robert B. Peters, founder of the company in 1952.

The company also announced that specialty nutrients will be marketed as part of the established Grace horticultural product line and will retain the Peters brand identity.

TREES

New York arborists honor Clarence Lewis

The New York State Arborists Association recently elected a number of new officials and presented several awards at their annual convention in Ellenville, NY.

Leo G. Cook, of Goodell Tree Service, Vestal, NY, was reelected president, Raymond M. Smith, of Davey Tree Expert Co., Tonawanda, NY, was selected first vice-president, and Jon Hickey, of Parr & Hanson, Hicksville, NY, was elected second vice-president. Edgar A. Dahlgren, of Davey Tree Expert Co., Latham, NY, was selected third vice-president at the proceedings.

Also at the convention, Clarence Lewis, a longtime educator in New York, was presented the NYSAA Achievement Award for his work in education and training in the horticultural profession.

Palmer Starner, past president of the NYSAA and charter member of the organization, was presented the Award of Merit for his outstanding service to the association.

NURSERY

Ohio arboretum plans unveiled by nurserymen

Plans were unveiled for the Chadwick Arboretum during the 1979 Ohio Nurserymen's Association annual January convention. The arboretum will be located in Inniswood Gardens in a very picturesque setting consisting of 97 acres in the north-east section of Columbus, Ohio.

The Chadwick Arboretum began as a tribute to "Chad" by the Kiwanis Club of Northern Columbus. The arboretum concept has been warmly received by the American Nurserymen's Association, the International Society of Arboriculture, the Ohio

Continues on page 86

THE PROVEN PERFORMER

TURF BLAZER 72"

Time tested, field tested, this rugged front mounted 72" mower is built for high capacity mowing, day in and day out, and with our "O" turning radius, you have the trimming capabilities of a small push-mower in congested or confined areas. A commercially constructed hydrostatic transmission enables the operator to establish a ground speed conducive to his varied mowing conditions.

Other sizes manufactured are 48", 60", 82" and 180" plus a full line of attachments. Are you looking to get the most for your mowing dollar? Call your local Turf Blazer distributor and ask for a demonstration.

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Manufactured by HOWARD PRICE TURF EQUIPMENT

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CONSIDERATIONS FOR USE OF CORRUGATED DRAINAGE TUBING

Proper drainage is one of the most important factors in successful landscaping; particularly with high-use turf areas, such as golf course greens, athletic fields, parks, picnic grounds, camp sites and the like. A drainage system, properly designed and installed, not only helps insure maximum use of such areas by removing excess water, but also does much to promote the overall health of turf, trees and plants in general.

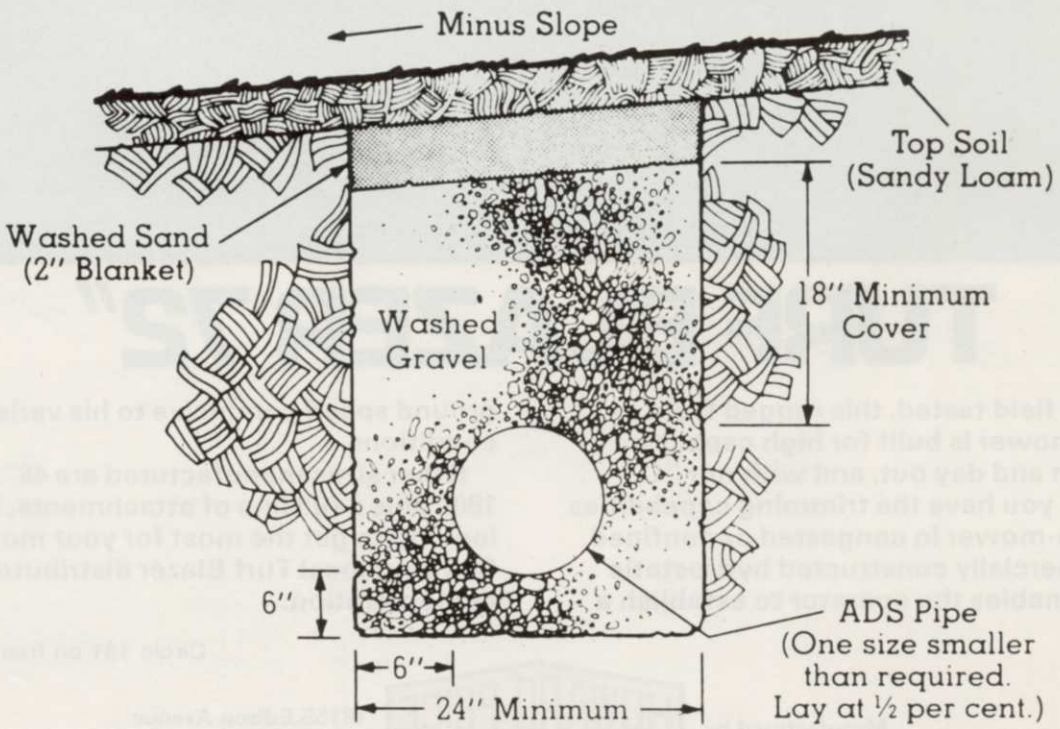
Primarily because of its economy, corrugated polyethylene drainage tubing is widely specified for golf course and landscape drainage. The material is lower in cost than many other types of drainage materials. It is also lighter weight, and easier and faster to install with smaller work crews and machinery. It can be used in narrow trench and drain plow installations, and connections can be made outside the trench, using snap-on fittings. No special tools or fittings are needed.

The material is durable, resists rot, acid and alkalis in soils, and is unaffected by freezing and thawing. Since it is continuous, it will not misalign; an especially important characteristic for unstable soils. For sandy and silty soils, drainage tubing is available wrapped in a factory-installed filter material that prevents clogging and blockage of the drainage line.

Benefits of drainage

The most obvious benefit is the rapid runoff of rainwater, to help provide maximum playability

Typical Slope Drainage Collection System



and use of greens, fairways, athletic fields and other high-use areas. Ron Reeve, Technical Director of Advanced Drainage Systems, Inc., a leading manufacturer of corrugated plastic drainage tubing, points out these additional benefits of landscape drainage:

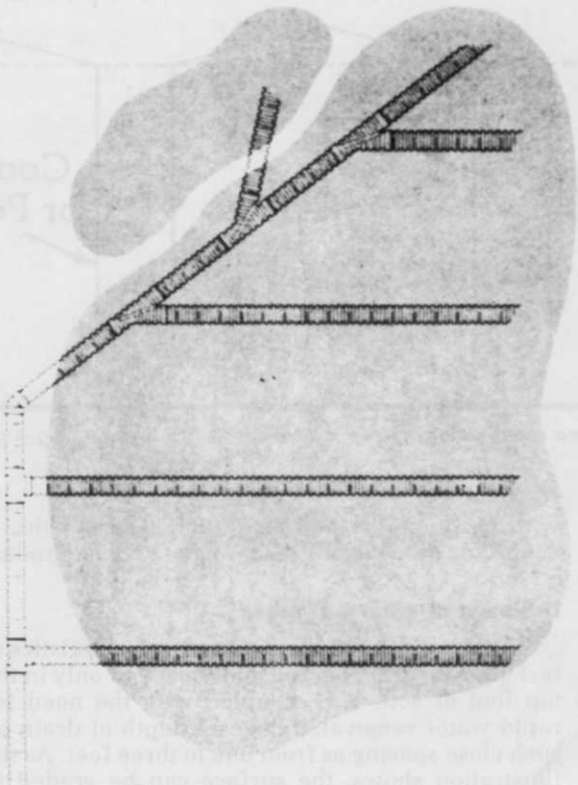
- Improves aeration, for growing healthy trees, shrubs, plants and the hardy turf required in high-traffic areas.
- Removes excess groundwater, thus increasing root zone depth.
- Favors nitrification and bacterial action: plants also have greater resistance to fungi and insects.

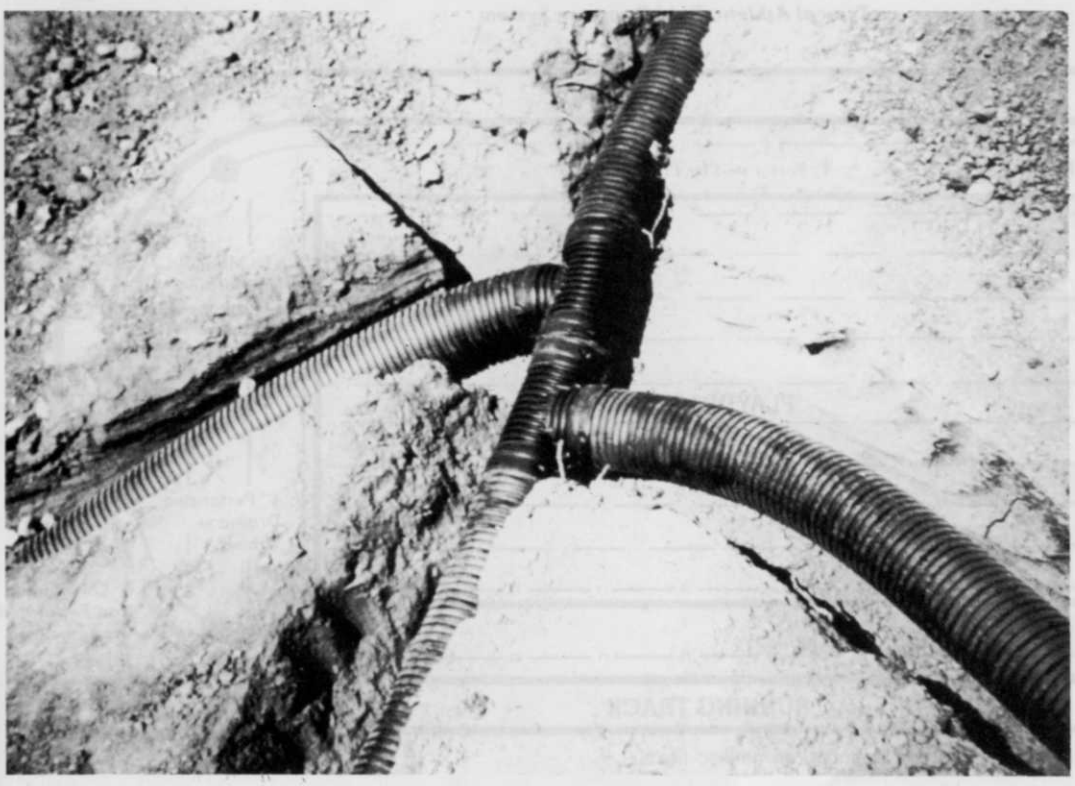
Golf course drainage

The soil stabilizing action that promotes healthy landscapes and turf, as well as the rapid runoff of surface water, is a vital concern of golf course architects and golf course superintendents, whose primary responsibility is to maintain playability of the course. When the course is frequently too wet, maintenance and repair costs increase while revenues decline.

Total course drainage is needed in many areas, but in some cases drainage of greens, traps and local wet spots will suffice. In designing golf course greens, 3-inch and 4-in. diameter tubing is commonly specified. The tubing is placed approximately 18 in. deep and spaced from 4 to 10 ft. apart for rapid drainage. Corrugated drainage tubing,

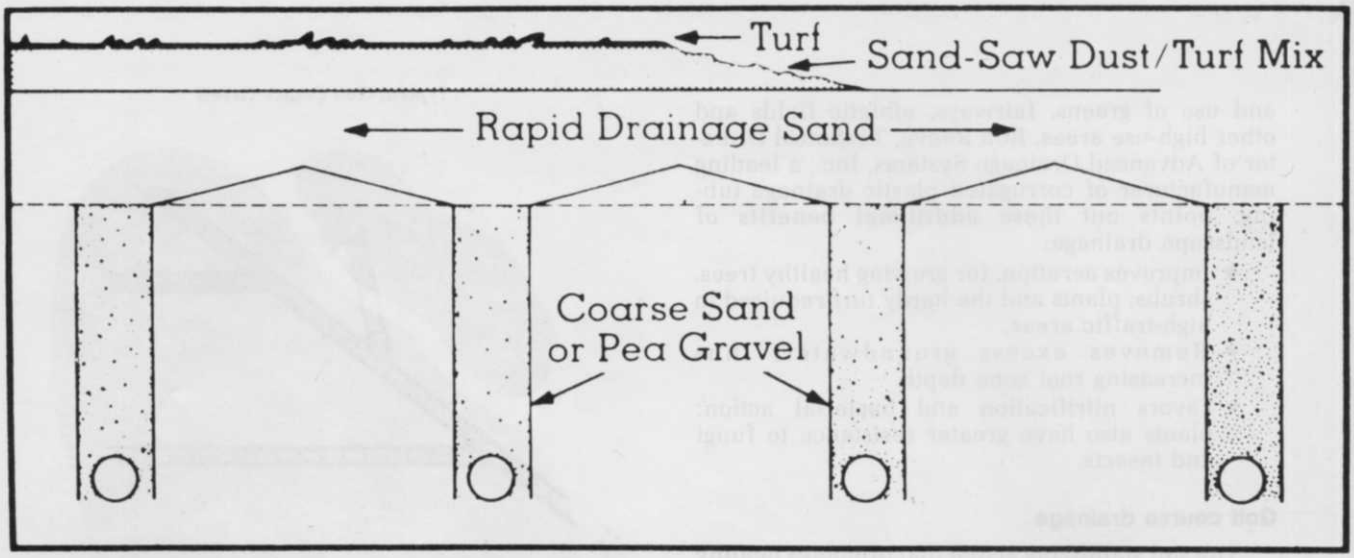
Typical Golf Course Green





Joints present fewer problems with plastic tubing.

Drainage



Where rapid water removal is needed, narrow strip grading is preferable.

with its flexibility and continuous roll lengths, is suited for quick installation in odd-shaped greens.

Drainage of other turf areas

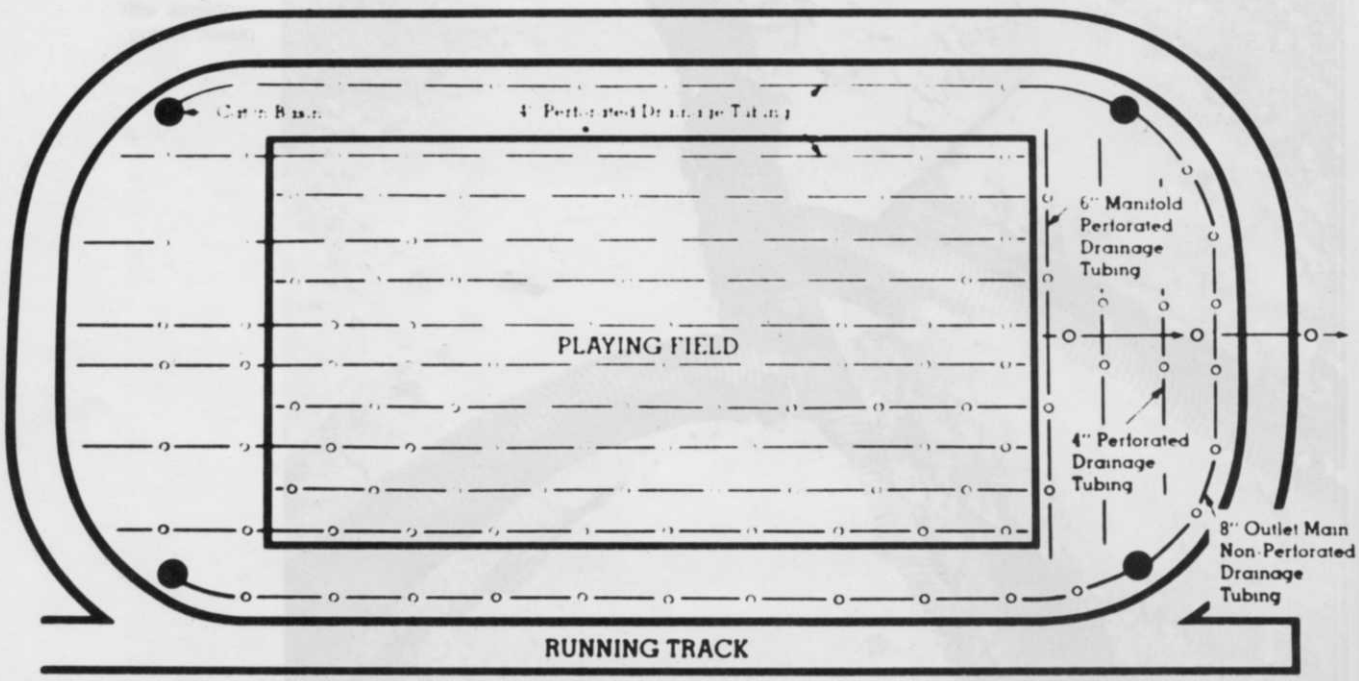
Because of the shallow-rooted characteristics of turf grasses, drainage is usually needed only in the top foot of soil. This, coupled with the need for rapid water removal, dictates a depth of drain on such close spacing as from one to three feet. As the illustration shows, the surface can be graded in narrow strips, with peaks and valleys like a roof, to facilitate rapid runoff control.

In well-trafficked areas where soil compaction and lack of slope cause surface water to pond, a shallow subsurface drain with surface water inlets may be the answer.

In the case of athletic fields and other places where it is desirable to use the area as soon as

Continues on page 23

Typical Athletic Field Drainage System



To handle play without damage requires good drainage on athletic fields.

Now, a revolutionary irrigation controller that gives you unmatched flexibility and accuracy.

Another way J-M Buckner® Waterscaping helps you keep things green.

J-M Buckner is first to offer you dependable, solid-state microelectronics in an irrigation controller. It's our KCS line for golf course, commercial, agricultural and residential applications. They're as easy to operate as a pocket calculator. Twelve or twenty-four individual circuits and four 14-day schedules are accurate to a fraction of a second. KCS totals daily watering time, allows skipping up to nine days, has both automatic and manual syringe cycles and many more unique features. It's designed for accurate, reliable performance to save you time and money.

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How many will you

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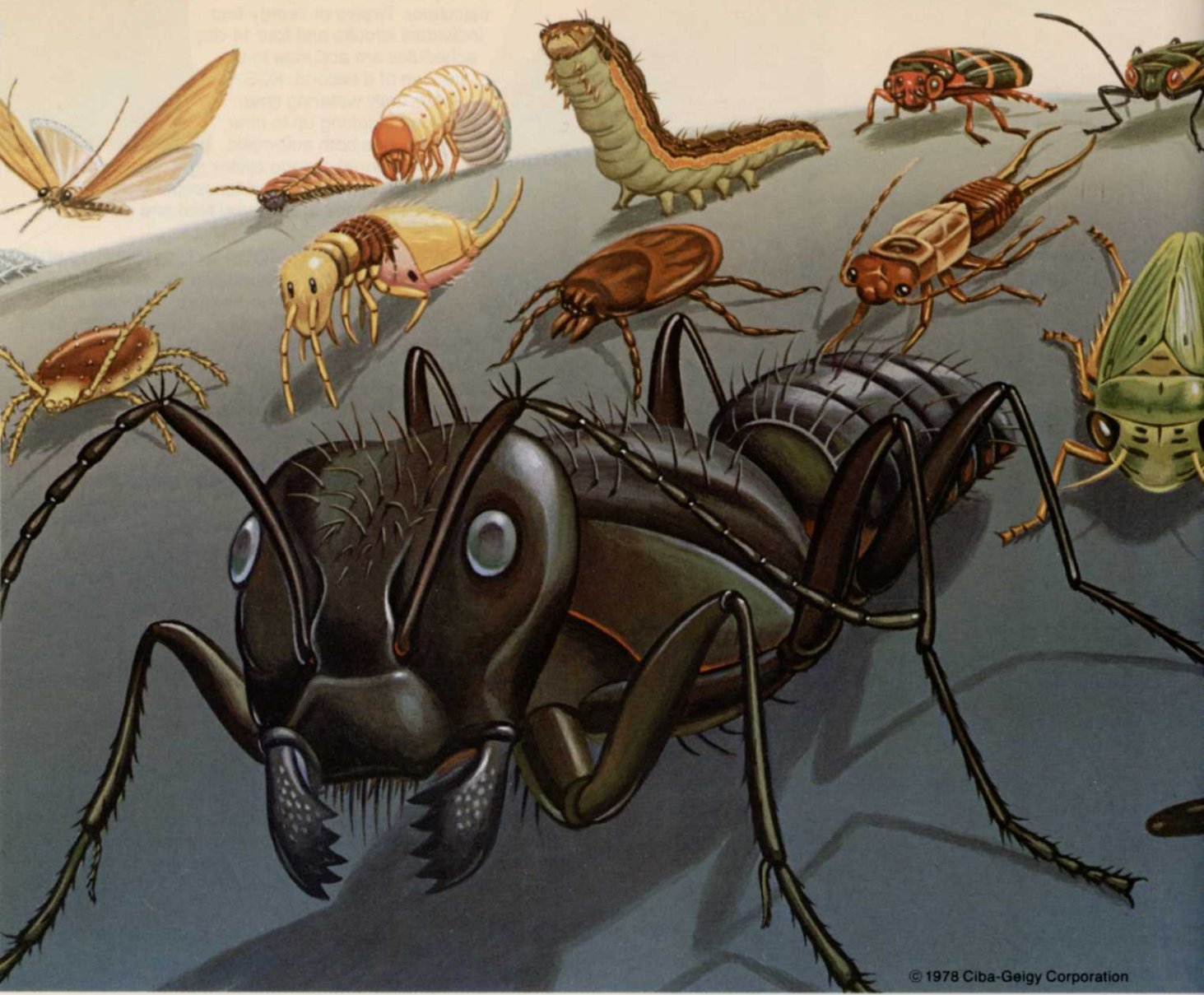

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every insect on this page. face this season?

armyworms and ants.

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Drainage *from page 18*

possible after a downpour, a drainage system providing runoff that keeps up with rainfall may be justified. In areas of high intensity rainfall, design drainage rates as high as 1/3-in. per hour or 8 in. in 24 hours (160 gpm per acre) are used.

In the example shown, a football field 160 by 360 ft., 10 lines 300 ft. long, spaced 16 feet apart are used. Each line would handle the flow from 16 by 360 ft., or 5,760 sq. ft. (or 0.13 acres). Water flow requirement is 21 gpm per line. For a slope of 0.04, 3-in. tubing is adequate. For a slope of 0.100 4-in. tubing is required.

While drainage is certainly a major factor in successful landscaping, its cost, in proportion to the overall construction budget, is small. Depending upon locality and conditions encountered, drainage cost represents only about 8% to 10% of a total golf course construction budget and only about 5% of a landscaping budget. **WTT**

Four-inch golf course drain in shallow trench and covered with gravel for rapid intake.

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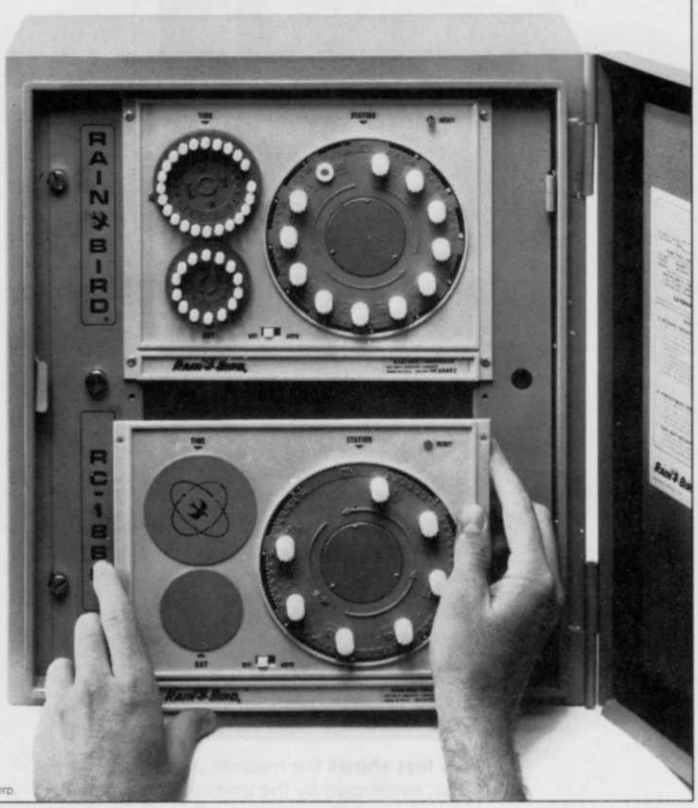
We'll give you a custom package complete with Heavy Duty Metal turf cabinet, one RC-7A and one RC-1230, for 18 total stations hooked in series (a little growing room never hurts).

The savings per station for both you and your customer can be substantial. Nearly half the cost of one big 18-station controller.

So think about Rain Bird next time you need a custom controller package.

No sense paying more for rain than you really need to.



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PROFESSIONAL APPLICATOR MUST KNOW MIXING BASICS

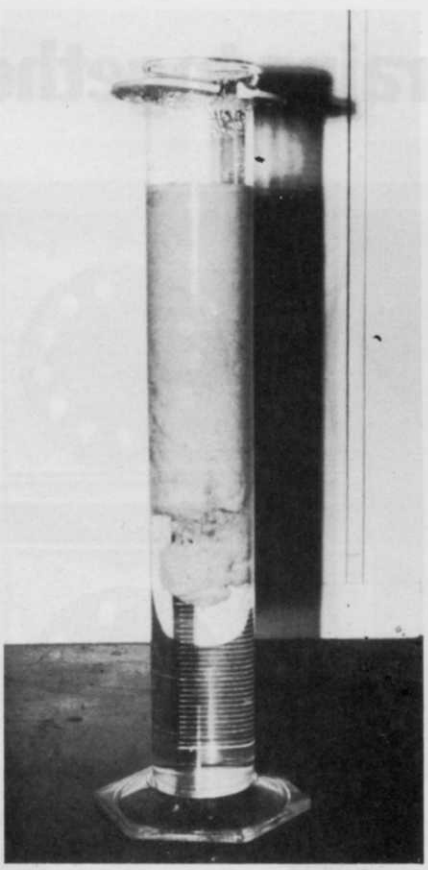
by Paul A. Sartoretto, Ph.D.

Can a pesticide applicator get by without a knowledge of chemistry and still determine what pesticides are compatible in the spray tank? A knowledge of chemistry is helpful, but not essential if one masters a few basic rules.

A professional must know that the pesticides he mixes in water will retain their own identity and not react with each other. The following four rules and exceptions are helpful in determining tank mixes. However, if there is any doubt, simple tests using a glass jar can be used to check compatibility.

Green Industry applicators are concerned primarily with water mixes. Therefore, the need is to determine how each chemical reacts with water and how each chemical reacts with other chemicals in a water system.

Dr. Sartoretto is a member of the board of W. A. Cleary Corp., Somerset, NJ. He is also director of research and development for the company. Sartoretto has a Ph.D. in chemistry from Notre Dame.



This test shows the material mixes well with water, evidenced by the uniform dispersal as the material falls with gravity.

All chemicals can be classed into three groups; cationic (positively charged), anionic (negatively charged), and nonionic (no charge). Positively charged chemicals (cations) attract negatively charged chemicals (anions). Nonions have no attraction to other chemicals, but their ability to mingle (solubility) with other nonions of similar structure must be recognized. In a water system, nonions that are soluble are termed hydrophyllic, and nonions that are insoluble are termed hydrophobic.

When cations and anions are mixed together they form salts. When large heavy cations and heavy anions come in contact, they form heavy salts which are insoluble and precipitate out of the mix. (Precipitate means to separate out of the solution or suspension, usually a visible solid dropping to the bottom of the container). Smaller cations and anions form smaller salts which can co-exist in solution without precipitating. The specific cations and anions that might cause problems are listed in the "Exception to the Rules" section of this article.

The basic principle of chemical compatibility is the classification of all chemicals, whether they be herbicides, fungicides, insecticides or fertilizers, into two groups: **solubles** and **insolubles,** because it's the physical properties not the chemical properties that determine compatibility 99% of the time.

Having then classified all chemicals into solubles and insolubles, I have devised a set of rules which when followed carefully permits the applicator to tank mix at will without incurring phytotoxicity. E.P.A. has devised key signal letters which alert applicators and inform them whether or not the product they are using is soluble or insoluble. These signal letters are as follows:

S	indicates	solution
SP	"	soluble powder
EC	"	emulsifiable concentrate
WP	"	wettable powder
F	"	flowable

The S, SP, and EC are classified as solubles; whereas, the WP and F are insolubles.

The amount of water sprayed per 1000 sq. ft. is another variable that requires some explanation that will affect the pesticides that should or should not be mixed in the spray tank. For example, an applicator will use 3 to 5 gallons per 1000 sq. ft. on greens and tees, and only ½ to 1 gallon per 1000 sq. ft. on fairways, depending upon whether he is using a mist blower or a spray boom.

By far, the largest group of chemicals are the insolubles. Most technical chemicals are, for all practical purposes, insoluble in water. The

Continues on page 26

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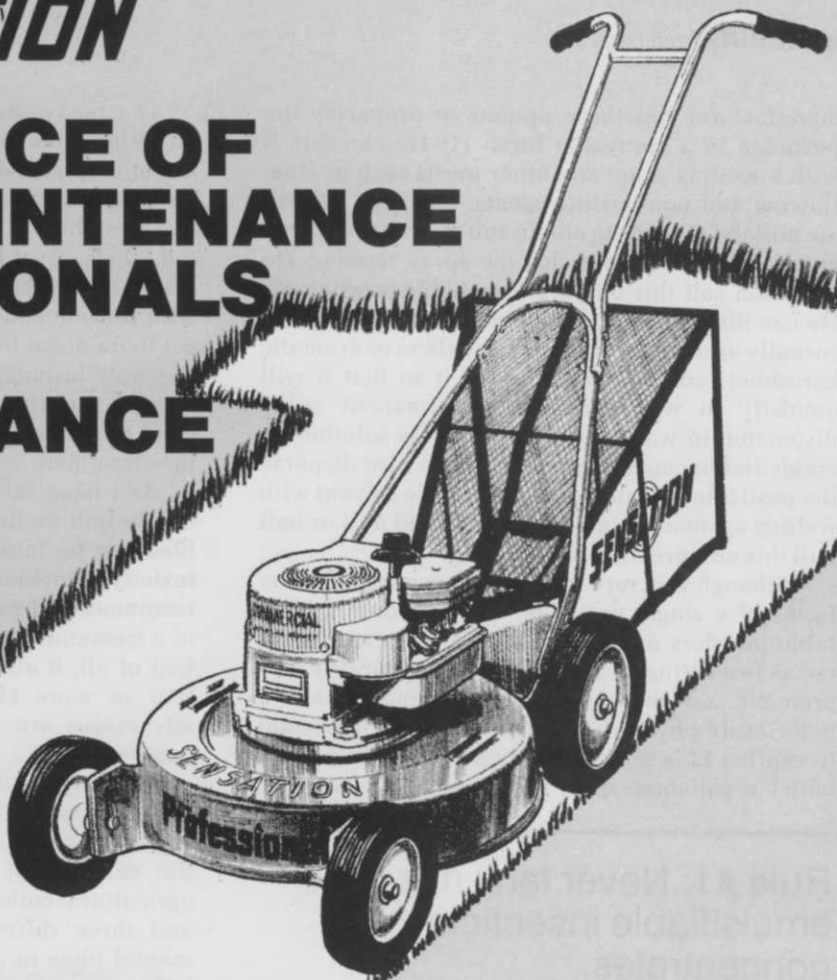

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Compatibility *from page 24*

manufacturer has three options in preparing the pesticide in a sprayable form. (1) He can mix it with a wetting agent and other inerts such as free-flowing and non-dusting agents, and then he will air-mill the mixture to obtain sub-micron size particles so that it will not clog the spray nozzles. He will then call this mixture a wettable powder. (2) He can dissolve the pesticide in an organic solvent (usually aromatic spirits such as xylene or aromatic kerosene), add an emulsifier to it so that it will emulsify in water to give a permanent milky dispersion in water, and will call this solution an emulsifiable concentrate. (3) He can also disperse the pesticide in water or water soluble solvent with wetting agent and stabilizers then sand mill or ball mill this mixture into a flowable.

Although it is rare, one can encounter all three forms of a single pesticide: EC, WP, and F. Wettable powders and flowables are safer to use but not as fast acting as emulsifiable concentrates. The aromatic solvents used in preparing EC's are notoriously phytotoxic. This is why it is important to confine EC's but are rarely used. The EC's used with low gallonage spray invite phytotoxicity.

Rule #1: Never tank mix emulsifiable insecticide concentrates.

Rule #2: All insolubles can be tank mixed without incurring phytotoxicity provided the products are sprayed at recommended rates.

Rule #3: Only one soluble chemical can be tank mixed with any number of insolubles. If two soluble chemicals are tank mixed with or without insolubles, the rate of each soluble should be cut in half to avoid phytotoxicity.

Rule #4: Soluble fertilizers and trace elements can be added individually or mixed, provided the amount will not exceed one ounce solid per gallon tank spray mix.

To guard against such an occurrence we formulate **Rule Number 1. Never tank mix emulsifiable insecticide concentrates.** Not only will you incur phytotoxicity from the aromatic solvent sitting on the grass blade, but the insecticides, according to the labels, must be sprayed with large volumes of water (10 to 30 gallons), sometimes followed up with recommendations to water them in heavily to get them down to grubs. The wettable powder and flowable formulations will not burn but must still require watering for grub proofing. However, they can be used with a limited amount of water for surface treatment and can be treated as insolubles.

As I have said before, the largest category are the insolubles. **Rule Number 2 states that all insolubles can be tank mixed without incurring phytotoxicity provided the products are sprayed at recommended rates.** This permits the tank mixing of a tremendous variety of chemicals. Most important of all, it allows the applicator to spray three, four or more chemicals at the same time. The advantages are unbelievable if he explores the possibilities.

Broad spectrum control, where money is no object, is a must. The applicator should not rely on a single chemical to control a target disease. Follow the example of the pathologists at the various agricultural colleges. Note how they are mixing two and three different fungicides in their experimental plots in an attempt to achieve better control.

The trend that I have tried to pioneer over the last 20 years is precisely in this direction and many competitive manufacturers have joined in. More recently, with the advent of systemic fungicides the broad spectrum mixture has assumed brighter and newer horizons because of the longer residual control attainable with the addition of a systemic along with one or two contact fungicides in the spray tank.

Prior to the systemics, it was an accepted fact that contact fungicides did their job on the grass blade and in the thatch and were dissipated within two to three days. A good contact fungicide will kill germinating spores at a few parts per million. It is usually sprayed on the grass blade at about 5,000 parts per million. With the present-day irrigation and mowing practices, it doesn't take more than two to three days to get down to a dilution below the effective five parts per million.

In hot, humid weather accompanied by sporadic showers, an applicator had to spray twice a week, otherwise his grass would go unprotected the latter part of the week. This is not the case since the advent of systemics. They hydrolyze in the soil to knock down the fungus population, not only in the soil but also within the grass blade by diffusion through the root system, thereby giving extended protection.

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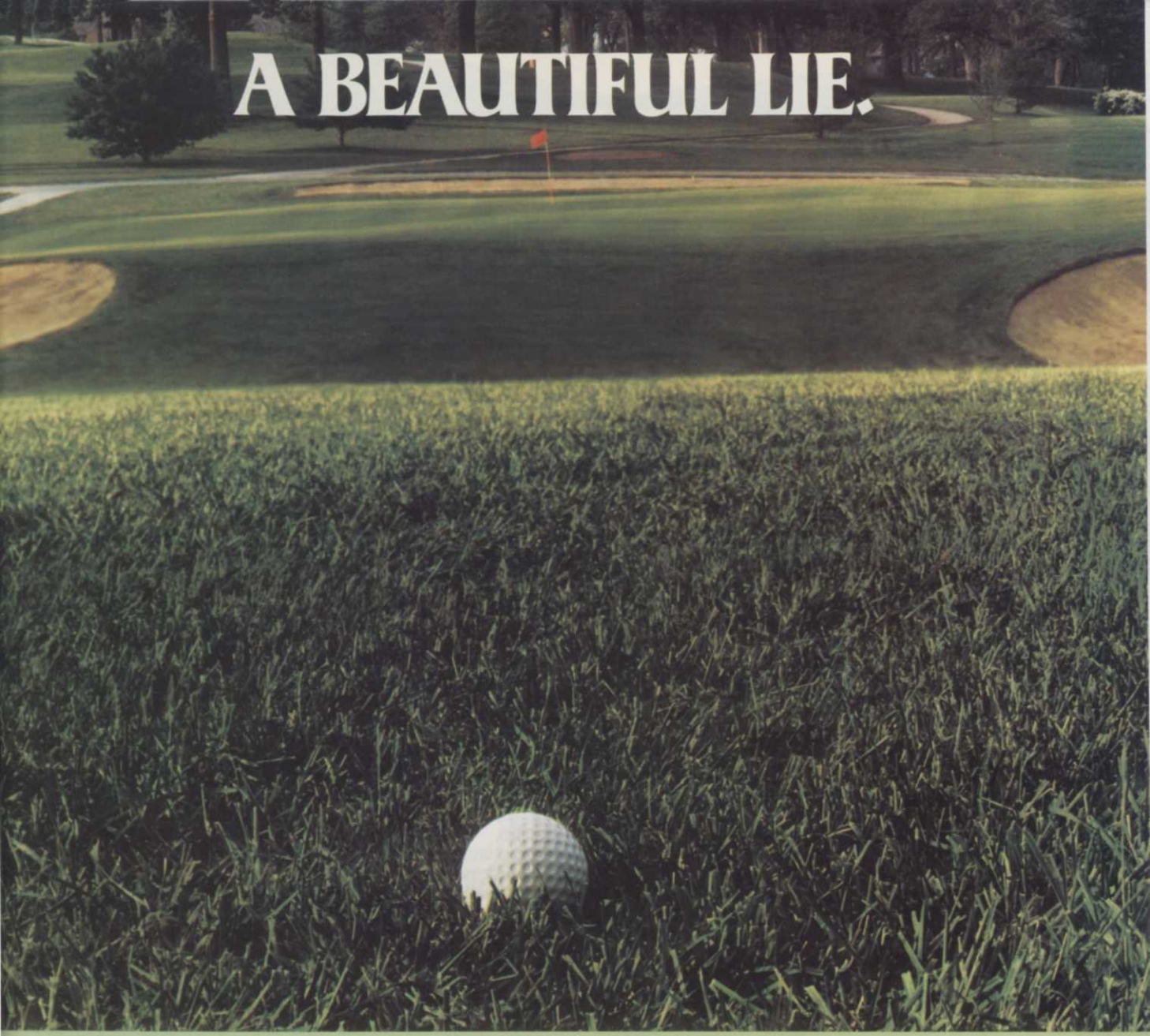

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How to pick

B5100
2- or 4-wheel drive.
12 hp. 2 cyl.

Designed for grass cutting, vegetable gardens, and general estate maintenance. For home owners, this tractor is a step up from riding mowers. Can use mid-mount or rear-mount mower, rotary tiller, plow, disc harrow, rear blade.

B6100
2- or 4-wheel drive.
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Similar to B5100, but bigger engine offers more pulling power. Can handle all the same implements as the B7100DT. Good tractor for landscapers, nurserymen, and other commercial users requiring a tractor to handle variety of materials.

B7100DT
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16 hp. 3 cyl.

Our biggest selling tractor. Small enough for grass cutting and general work around private homes. Strong enough for a wide variety of commercial applications, especially park maintenance, nurseries, landscape contractors. Implements include post hole digger, front blade, trencher, front-end loader, backhoe, snowblower, as well as all those listed under B5100.

L185
2- or 4-wheel drive.
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Works as mowing tractor with turf tires. With 2-wheel drive it is versatile chore tractor on large farms. For farm or industrial use where ground is soggy, we recommend 4-wheel drive for maximum traction. Category 1 3-point hitch can handle plow, cultivator, disc harrow, rotary tiller. Also a wide range of earth moving and excavating implements. Rental operators will find this model in great demand.

L245
2- or 4-wheel drive.
25 hp. 3 cyl.

This model has man crop applications, es cially vegetable grow and orchard work. A range of implements available, including hoe, front-end loade post hole digger, fro blade, box scraper.

L245HC (not sh
2-wheel drive.
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New high-clearance tractor, ideal for spec crops such as vegeta and tobacco. Provid ample 22" ground cl ance plus an unclutt off-set operator's pla form for excellent visibility.

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All Kubotas have water-cool diesel engines, which are designe with more cylinders than many competitive models. Standard equ ment on all models includes rear PTO and a 3-point hydraulic hitc that accommodates a variety of implements.

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285
-wheel drive.
) hp. 4 cyl.
-cylinder diesel engine rovides lots of smooth ower. Built to accom-odate a long list of nplements, including otary rear-mount ower, tillers, disc rrows, box scraper, ont blade, front loader, ckhoe, plow. Good ain tractor on small rm. Also wide applica-on for institutional or overnmental grounds aintenance. With ont loader, it is excel-nt machine for dairy rmer.

L295DT
4-wheel drive.
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Will outpull many larger farm tractors that only have 2-wheel drive. Can handle most medium-sized Category 1 farm implements. Also, earth moving capability makes it suitable for general building contractors. Outstanding fuel economy for its size. Draft and position control is standard.

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Good number one tractor for small farms, especially vegetable crops. Also excellent for many types of small to medium excavating work. 6 cylinders provide smooth torque. Quiet running. Economical to operate. 16 forward gears supply wide range of ground speeds to match many different implement uses.

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Whenever annual grasses and most broadleaf weeds are a problem in ornamentals depend on Elanco's new Surflan for months of weed control at a reasonable price.

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Compatibility *from page 26*

There are soluble fungicides as well. When applying soluble chemicals including fungicides, keep in mind **Rule Number 3. Only one soluble chemical can be tank mixed with any number of insolubles. If two soluble chemicals are tank mixed with or without insolubles, the rate of each soluble should be cut in half to avoid phytotoxicity.** Although they are not numerous, the superintendent is familiar with and has had experience in applying the soluble fungicides such as PMAS, Caddy, Cadminate and Actidione. The latter two are soluble in the spray tank. Coincidentally, three large manufacturers have mixtures of solubles with insolubles presently being marketed.

There is no question that the soluble fungicides have the clout necessary to stop an advanced fungus infection. One can only hypothesize why this is so, and the question resolves itself with the explanation of the difference between fungicidal and fungistatic activity. Fungicides kill whereas fungistats inhibit. But this explanation is too simple. When a spore germinates and sends out a tiny, tender shoot, it is easily killed. Since this is only visible microscopically, the net result determined by sight is that the chemical has prevented spore germination-fungistatic effect. If the spore germinates and the shoot gets a foothold within the grass blade, it takes a more powerful chemical to kill it — fungicidal effect. Some insoluble fungicides possess this advanced stage killing ability to varying degrees; but all of the solubles are immediately fungicidal.

The author has maintained for several years that the ideal tank mix of fungicides is a three-way combination of soluble contact/insoluble contact/insoluble systemic mixture; and, for years has even recommended mixing two soluble contacts, each at half rate to get a broader spectrum than the single soluble at full rate.

Applying rules 2 and 3 in an attempt to get a broader spectrum of control, all of the insolubles can be tank mixed. They can also be tank mixed with one of the solubles or one of the soluble-insoluble combinations. If the solubles and soluble-insoluble combinations are tank mixed, the dosage should be cut in proportion to the number of chemicals added. Because of the soluble portion of the group of soluble-insolubles, they should be treated as if they were solubles. It should be emphasized again that the dosages of two solubles should be cut in half if tank mixed. If three solubles are tank mixed, the dosages should be cut to one-

Continues on page 32

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Compatibility *from page 31*

third of the recommended rate of each soluble component.

A prime example is the successful combination of MCPP, 2,4-D and dicamba. The recommended rate of MCPP is between 1 and 1½ pounds per acre and the rate of 2,4-D is 1 pound per acre and the rate of dicamba is ¼ - ⅓ pound per acre. However, a successful combination of the three is in the neighborhood of ½ pound MCPP, plus ¼ pound 2,4-D, plus ⅛ pound dicamba. These come premixed in approximately that ratio under the trade names of Trimec and Trex-San.

There are some MCPP/2,4-D combinations in which the rate of MCPP is 1 pound and the rate of 2,4-D is ½ pound. Another example of the synergistic effect of two postemergent chemicals is the combination of DSMA and 2,4-D. In Texas, where 2,4-D is not prevalently used because of its injury to cotton, DSMA anhydrous is recommended for the control of dallisgrass at the rate of 7-10 pounds per acre on bermudagrass. In nearby Louisiana, equally good control has been achieved by the use of 4-5 pounds DSMA plus ½ pound of 2,4-D. This practice has been going on for more than 10 years and, coincidentally, it conforms with rule number 2, which dictates that if two solubles are used together it is a wise practice to cut the dosage of each in half.

Every pesticide applicator knows that fertilizers are usually combinations of insoluble components, and because of the soluble fractions the fertilizers must be watered in to prevent burning. It is not an uncommon practices to add soluble fertilizers to the spray tank in small quantities to attain an immediate greening effect on specific occasions. A more common practice is to add chelated iron for the same reason. But there have been instances of burning because an applicator had a heavy hand in applying these products.

The phenomenon known as salt index comes into play in determining how much of the soluble fertilizer components can be added to the spray tank without incurring phytotoxicity.

Rule Number 4 states that soluble fertilizers and trace elements can be added individually or mixed, provided that the amount will not exceed one ounce solid per gallon tank spray mix. The author has used two ounces per gallon, and has not experienced any burning at the higher rate, but prefers the lower rate. The components that fall into this category are solubles such as urea, ammonium nitrate, ammonium sulfate, muriate of potash, ammonium phosphate, ferrous sulfate, chelated iron, epsom salts, etc.

Exceptions to the rule governing compatibility of solubles is as follows: Heavy cations such as mercury and cadmium fungicides and Paraquat and Diquat are incompatible with heavy anionic herbicides such as DSMA, MSMA, 2,4-D, MCPP, MCPA, and DICAMBA. Precipitation will take place in the spray tank. These combinations are not likely to be used because selective weed control does not involve non-selective weed killers such as Paraquat or Diquat, and the applicator is not likely to use a soluble fungicide such as cadmium or mercury.

There are quick methods to check compatibility. When solubles are mixed with water in the proportion to be used in the spray tank, the solution should remain clear for the number of hours anticipated for spraying.

Emulsifiable concentrates should disperse throughout the water in a stable emulsion without incurring an oily layer separation on standing. The emulsifiable concentrates should be added last, after all solubles and wettables have been added. (However, I strongly urge not to tank mix emulsifiable concentrates).

If three solubles are tank mixed, the dosage should be cut to one-third of the recommended rate of each soluble component.

Thirdly, when wettable powders are components of a tank mix, after standing awhile, the mixture should be sieved through at least a 100 mesh screen. If residue appears on the screen, agglomeration or precipitation has taken place, signaling incompatibility.

These tests can be run in a convenient quart glass jar. The sieve screen should be wet with water with some surfactant added before sieving.

Soluble iron or magnesium salts might remain clear in the glass jar for about an hour and will then begin to hydrolyze in hard water or in water that has a pH of 7 or above. They will decompose to oxide precipitates that are of no value. Whenever possible, use chelated forms of iron and magnesium which will not hydrolyze. They are more expensive, but one can use far less and be able to count on their effectiveness.

Coincidentally, herbicides also fall into two classes— solubles and insolubles. The soluble herbicides are postemergent in nature whereas the insolubles are preemergent in activity. The insoluble preemergents are safe to apply because by their very nature they slowly release the active toxicant by hydrolysis in the soil (although certain preemergents exhibit some phytotoxicity on certain species and cultivars; however, these cautions are covered on the labels).

The rate of release of active toxicants is sufficient to kill the germinating weed seedling and, strangely enough, insufficient as a rule to kill the mature weed plant. The rate of release will determine the length of residual activity of the product. Each individual preemergent has its own time release schedule. The residuals range anywhere from 45 to 90 days, with an average of about 60 days.

It should be noted that one important factor which will materially alter the residual is oil structure. Adsorption of the hydrolytic toxicant by soil particles dictates different rates for different soils. Label directions must be carefully followed. But

Continues on page 34

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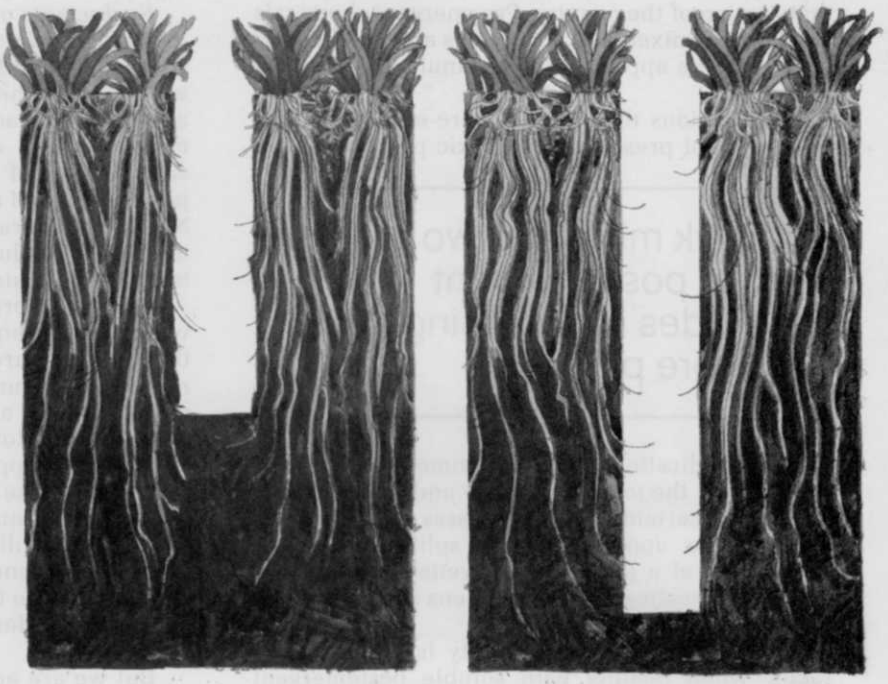

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the parent pre-emergent compound is an insoluble, thus nonburning.

Pre-emergents should be applied before the weed seed germinating season begins, which is usually in March, April or May depending upon that portion of the country. Preemergent chemicals can be tank mixed and sprayed as a wettable powder or can be applied with a granular carrier as a spreader.

It is obvious that wettable pre-emergent powders will not present a phytotoxic problem at the time of application. However, some preemergents will release the toxicant rapidly and pose a phytotoxicity to certain types of grasses such as bentgrass. Some applicators will split the rate of application of a preemergent wettable powder in half when treating bentgrass greens and put on two applications a month apart.

The tank mixing of two or three soluble postemergent herbicides is becoming more and more prevalent.

The problem of phytotoxicity is an important factor when dealing with soluble postemergent herbicides. As a general rule, the phytotoxicity index (safety factor) is narrow for all postemergent chemicals. Yet they are used rather extensively and effectively, provided the rates of application are followed closely. The tank mixing of two or three soluble postemergent herbicides is becoming more and more prevalent. This practice is useful because the applicator has found a synergistic effect with combination; but, in doing so he must again apply rule number 2 which states that whenever solubles are added to the spray tank the dosage rate should be cut proportionately, depending upon the number of solubles.

Surfactants or wetting agents should be treated as solubles. Wetting agents are usually added to the spray tank in order to reduce the surface tension of water so that the spray comes out as finer droplets and wets the blades of the weeds or grasses giving a more uniform coverage. This also reduces the safety factor of soluble herbicides and promotes phytotoxicity. If a wetting agent is used, apply Rule No. 3. Cut the rate of the soluble herbicide. When used with insoluble fungicides, it is not necessary to reduce the rate.

Finally, there are two classes of chemicals which are infrequently used by applicators and by their very nature cannot be tank mixed. They are nematicides, such as Dasanit and Nemagon, and general weed and grass killers such as Phytar, Paraquat and Roundup.

When the applicator embarks on a new formula it would be wise for him to practice on small areas, preferably his nursery.

Also, according to the federal Environmental Protection Agency, if a chemical applicator willfully uses more than the recommended amount on the label and destroys turf, he is technically criminally libel.

But we are addressing ourselves to applicators who are faced with multiple diseases and multiple weeds. In this situation, one single product is inadequate, and it becomes costly and somewhat ridiculous to spray each individual product separately. But never apply more than the amount recommended on the label, and following the rules outlined in this paper, it is necessary to split dosages of solubles.

Solubility and Formulation

	EC, S, SP Solubles		WP, F Insolubles		Soluble-Insoluble Combinations
FUNGICIDES					
	PMAS		Tersan 75	Fore	Calo-Clor
	Caddy		Tersan LSR	Maneb	Kromad
	Cadminate		Tersan SP	Zineb	Actidione RZ
	Actidione TGF		Spotrete	Captan	Actidione Thiram
			Bromosan	Daconil 2787	Thimer
			Spectro	Dyrene	Cadtrete
			3336	Fungo	
			1991	RP26019	
INSECTICIDES					
	Dursban	Malathion	Diazinon		
	Diazinon	Proxol	Dursban		
	Chlordane	Dylox	Sevin		
	Sevin		Malathion		
HERBICIDES					
	2,4-D	DSMA	Dacthal		
	2,4,5-T	MSMA	Tupersan		
	MCPP	AMA	Balan		
	dicamba	Betasan-EC			
FERTILIZERS					
	urea		ureaform		
	ammonium nitrate		IBDU		
	ammonium phosphate				
	ammonium sulfate				
	potassium nitrate				
	muriate of potash				

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TIMING, RATE ARE CRITICAL FOR PREEMERGENCE HERBICIDES

by Robert C. Shearman, Ph.D.

Premergence herbicides play an important role in turfgrass maintenance programs. Timing of application is critical in their effectiveness. They must be applied prior to weed germination or emergence. An application two weeks prior to anticipated emergence of the target weed is generally suggested. This allows sufficient time for the preemergence herbicide to form a chemical barrier at or near the soil surface. Susceptible weeds germinate, absorb the herbicide, and are killed.

Preemergence herbicides are commonly used to control weedy, annual grasses like crabgrass, goosegrass, and foxtail. Some are also effective in controlling annual, broadleaf weeds such as prostrate or spotted spurge. Effectiveness and longevity of control depends upon the (a) preemergence herbicide, (b) application rate and timing, (c) weed species, (d) environmental conditions, (e) soil type and reaction, (f) cultural practices and (g) microorganism activity. Before selecting a preemergence herbicide turfgrass managers should check with local researchers and specialists for the chemicals that perform well in their area, and for the appropriate rates and timing of application.

Preemergence herbicide application rate and timing are critical aspects for effective weed control. A threshold level of herbicide activity must be maintained past the period of germination for the target weed to obtain satisfactory results. Figure 1 illustrates this point. Herbicide I maintains a soil concentration above the threshold level past the period of weed germination. Herbicide I would give effective weed control, while, Herbicide II fails to maintain a satisfactory concentration throughout the germination period. Herbicide II would require more than one application to give effective control of the target weed. When weed pressure is heavy or the germination period is extended weed control is more difficult. A heavy initial application rate or more than one herbicide application may be necessary under these conditions. If herbicides are applied too early, the chemical barrier may break down and allow weed infestation to occur. In turn, if the herbicide is applied too late germination will have already occurred and ineffective weed control will result.

Preemergence herbicides offer definite advantages to turfgrass managers. They are beneficial in maintaining the integrity, quality, and function of the turf; while they give effective and relatively safe selective control of emerging weeds. Preemergence herbicides, like other pesticides, have limitations and should be used appropriately. They cannot substitute for ineffective cultural systems, and must be incorporated with sound mowing, fertilizing and watering practices. Along with the advantages of using preemergence herbicides there are some potential disadvantages that should be considered. Some are rather obvious in nature. For instance, applications at the recommended rates for crabgrass and annual bluegrass will reduce germination of overseeded, cool-season turfgrass species. Reduced rates of siduron (Tupersan) is an exception, since it is recommended for seedbed application of certain turfgrass species and cultivars.

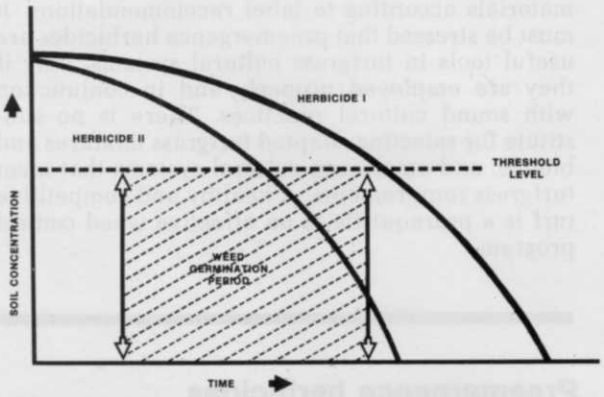

Figure 1. The preemergence herbicide must remain at sufficient concentration in the soil throughout the germination period of the target weed.

Other detrimental effects of preemergence herbicide applications appear to be more subtle in nature than the influence on seedling emergence. Almost every preemergence herbicide has been reported to influence some aspect of turfgrass growth, development, and performance. Successive annual applications or repeated applications within a year are particularly suspect. Decreased root and rhizome production, reduced sod strength and transplant rooting, reduced low temperature tolerance, increased high temperature and drought stress, and increased incidence of disease on susceptible turfgrass species and cultivars have been reported for the various preemergence herbicides commonly used in turf. However, these reports are contradictory and confusing since a particular herbicide may cause injury in one case and not another.

Turfgrass injury resulting from preemergence herbicides can usually be related to factors such as: (a) the species or cultivar treated, (b) herbicide used, (c) herbicide concentration or application rate, (d) soil type (e) cultural practices, and (f) amount of thatch present. These factors should be

Dr. Shearman is turf specialist and assistant professor of horticulture for the University of Nebraska, Lincoln. Shearman earned his graduate degrees in turfgrass physiology at Michigan State and his B.S. from Oregon State University. He is chairman of the Nebraska Turf Conference and a member of the Weeds Trees & Turf Board of Advisors.

given careful thought and equal consideration to the efficacy of the product, when reviewing a preemergence herbicide for use in a maintenance program.

The turfgrass manager should select the materials that appear safest and most effective based on research in his area, and apply these materials according to label recommendations. It must be stressed that preemergence herbicides are useful tools in turfgrass cultural systems, only if they are employed properly and in conjunction with sound cultural practices. There is no substitute for selecting adapted turfgrass mixtures and blends, and employing cultural systems that meet turfgrass requirements. A healthy and competitive turf is a prerequisite to an effective weed control program.

Preemergence herbicides and their effect on thatch

Dr. Al Turgeon in the Department of Horticulture at the University of Illinois has reported extensively on the development of thatch due to preemergent herbicides and also the effect of thatch on the control of annual weedy grasses with preemergent herbicides. While some preemergent herbicides do induce thatch, it is more because of their effect as a pesticide on the earthworm and soil microbial balance.

Thatch results, according to Dr. Turgeon, because of an imbalance between opposing processes of accumulation and decomposition of organic material. He suggests that where any chemical that induces thatch is used, a cultural program should be adjusted to compensate for the loss of earthworms and other organisms that are important in decomposing the thatch and generally improving soil physical conditions.

This may involve periodic verticle mowing, aeration, topdressing, or other practices to overcome the adverse effects of the chemicals on the turfgrass ecosystem.

In an experiment to determine the effect of thatch on preemergence herbicide activity in Kentucky bluegrass, Dr. Turgeon found that, while preemergence control was excellent on thatchy plots, there was some amount of turfgrass injury that was not as severe as on thatch-free plots. This may be due to at least two factors: Herbicides are more mobile in thatch than in soil, thus, as more herbicide enters the rootzone, more injury results; and since there were no observations of differences in mobility between benefin and DCPA, the selectivity of preemergence herbicides may be due to biochemical as well as mobility differences. The following chart indicates a comparison of crabgrass control on thatchy and thatch-free Kentucky bluegrass. Herbicides were applied April 24, 1976 and April 21, 1977.

Injury ratings were an average of observations made July 21, 1976 and July 18, 1977. They are based on a scale of one to nine, with one indicating no injury and nine indicating necrosis of turf.

The percentage of crabgrass cover is an average of visual observations made August 13, 1976 and September 8, 1977. The sites were overseeded with crabgrass each year.

Continues on page 42

Effect of Thatch on Preemergence Herbicide Control

			Injury to Turf		Percent Crabgrass Cover	
Treatment	Form	Kg/ha[1]	Thatch-free	2-3cm Thatch	Thatch-free	2-3cm Thatch
benefin	2.5G	2.2	1.0	3.0	5.3	1.1
		3.4	1.0	3.6	5.7	0.7
		4.5	1.0	4.6	2.0	0.1
bensulide	4E	11.2	1.0	1.1	4.7	0.1
		22.4	1.0	1.6	10.3	0.1
	3.6G	11.2	1.0	1.6	1.6	0.1
		22.4	1.3	2.1	0.3	0.4
	12.5G	11.2	1.0	1.0	2.0	0.6
		22.4	1.0	1.6	3.0	0.1
DCPA	75WP	11.8	1.0	1.0	2.6	1.1
		23.5	1.0	1.3	2.6	1.3
	5G	11.8	1.0	1.1	3.7	1.3
		23.5	1.0	1.1	3.0	1.1
oxadiazon	2G	2.2	1.0	4.6	9.0	2.3
		3.4	1.0	5.6	2.8	0.0
		4.5	2.0	6.3	4.3	0.0
prosulfalin	50WP	2.2	2.0	2.1	6.0	0.2
		3.4	3.0	6.5	5.0	0.8
untreated			1.0	1.0	29.0	11.5
LSD 0.05[2]			0.3	0.9	8.0	2.7

1. Kg/ha multiplied times 1.12 equals lb./A.
2. Level of Significant Difference, i.e. under Injury to Turf, Thatch-free, observation figures must differ by 0.3 to be significant, by 8.0 under Percent Crabgrass Cover, Thatch-free.

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Goosegrass control with preemergence herbicides

Dr. Wayne Bingham, professor of plant physiology at Virginia Polytechnic Institute and State University, included some aspects of his research on goosegrass control at the recent Virginia Turfgrass Conference in Williamsburg, Virginia. While treatments for crabgrass control should go on in early March or early April, he said, goosegrass treatments should be delayed until May or even early June, when goosegrass germinates.

Dr. Bingham felt that his preemergent herbicide tests should be carried on for more than one

Continues on page 47

Goosegrass Control in Common Bermudagrass Fairway

	Kg/ha					Percent Goosegrass Control		
	1974		1975		1976	1974	1975	1976
Herbicide	4/16	9/5	4/3	8/20	4/12	9/5	6/22	8/26
Oxadiazon	3.4		3.4	3.4	3.4	100	100	100
Butralin or Prosulfalin	4.5	4.5	3.4	3.4	3.4	38	88	100
Bensulide or Butralin	11.2	11.2	11.2	11.2	4.5	0	0	38
Benefin	3.4	3.4	3.4	3.4	3.4	0	88	100
DCPA	16.8	11.2	17.9	11.2	17.9	50	38	62
Check	——	——	——	——	——	0	0	0

[1]Prosulfalin was applied 9/5/74 at 3.4 kg/ha.

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year for a good evaluation of control. Variability between locations became a factor.

When the new herbicides began to show up and their effect on goosegrass control showed them to be important, they were looked at and critically compared to find which had the best results. Dr. Bingham found that if he split application, control was better.

Oxadiazon, however, seemed to work just as well whether it was applied all at once or split. With DCPA, bensulide and benefin, better results were achieved with a split application.

The following charts show a comparison of goosegrass control over a three year period, the first indicating control and the second indicating the amount of bermudagrass filling the plots back in.

Goosegrass Control in Common Bermudagrass Fairway

	Kg/ha[1]					Bermudagrass ground cover[2]				
	1974		1975		1976	1974	1975		1976	
Herbicide	4/16	9/5	4/3	8/20	4/12	4/16	5/30	7/22	6/14	8/26
Oxadiazon	3.4		3.4	3.4	3.4		104	132	137	144
Butralin or Prosulfalin	4.5	4.5	3.4	3.4	3.4		108	127	122	143
Bensulide or Butralin	11.2	11.2	11.2	11.2	4.5		69	79	117	132
Benefin	3.4	3.4	3.4	3.4	3.4		115	127	131	144
DCPA	16.8	11.2	17.9	11.2	17.9		108	104	115	138
Check	——	——	——	——	——	33	43	72	83	122

[1]Kg/ha multiplied times 1.12 equals lb./A.
[2]144 square feet = complete coverage of the plot.

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SCOTTISH GREENKEEPERS PRESERVE NATURAL CHALLENGE OF COURSES

by Stan Metsker

Stan Metsker made the trip to Scotland in September of 1977 to bring back ideas for the Country Club of Colorado where he is the Superintendent. For the last five years he has been working with architect Peter Dye, who designed and constructed the course, to develop some of the Scottish links atmosphere.

Gorse at Gleneagle Golf Course. The sharp-leaved gorse receives great respect from golfers and rarely gives back balls hit into it.

It is easy to see why Golf started in Scotland. The courses were there just waiting to be discovered. The dunes formed the contours, the grass was so starved that it was thin and easy to find a ball in, and the rabbits and sheep kept the grass down enough to form what later became mowed greens. Next to the sea (the links land) there are dunes of beachsand that provide so many possible natural golf holes that the biggest problem must have been in choosing which way to lay out the course to the fullest advantage.

The old rules of golf called for the teeing area to be within two clublengths of the previous hole. Even now, the next tee may be almost that close to the edge of the just completed green. This contributes to fast play in Scotland where everybody walks.

All the courses are not maintained alike nor do they look alike. The manufactured look of American courses can be found, but it is the exception. The maintenance of these courses is quite different from that in the U.S. Greenkeeper Norman Ferguson of Troon Golf Club uses the following methods:

- Fertilize with nitrogen only, once in spring and once in summer.
- Mow fairways once per week.
- Mow greens three times per week when growing well, twice when slower.
- Change cups once per week.
- For insects use DDT or Chlordane.
- After aerifying greens, topdress Turface into low spots and compost into high spots.
- Irrigate only enough to make the grass survive dry periods.

Like most other Greenkeepers in Scotland he has no triplex greens mowers, no power trap rake or trucksters. He does have some automatic irrigation of greens and, even more rare, some automatic irrigation on the fairways. As with other courses, one of his big continuous problems is rabbits. They are forever digging holes.

To understand the vegetation of a links course you must remember that the "soil" is almost pure dune sand and that the weather is that of an island (high humidity) on the same latitude with the Hudson Bay in Canada, Southern Alaska, and Southern Sweden. The climate is generally cool, windy and frequently rainy. But, there are occasional droughts.

These infertile, acid, and fast draining soil conditions call for some pretty tough plants. Gorse *(Ulex europaeus)* is the most abundant and most respected bush. It is full of spine and is impossible to walk through. It blooms in the Spring and has pods that snap open on sunny fall days. It grows from a few in. to six ft. high and often is mixed with brambles such as blackberries. Gorse is often seen on the top of the dunes.

Heather *(Culluna)* grows in clumps very close to

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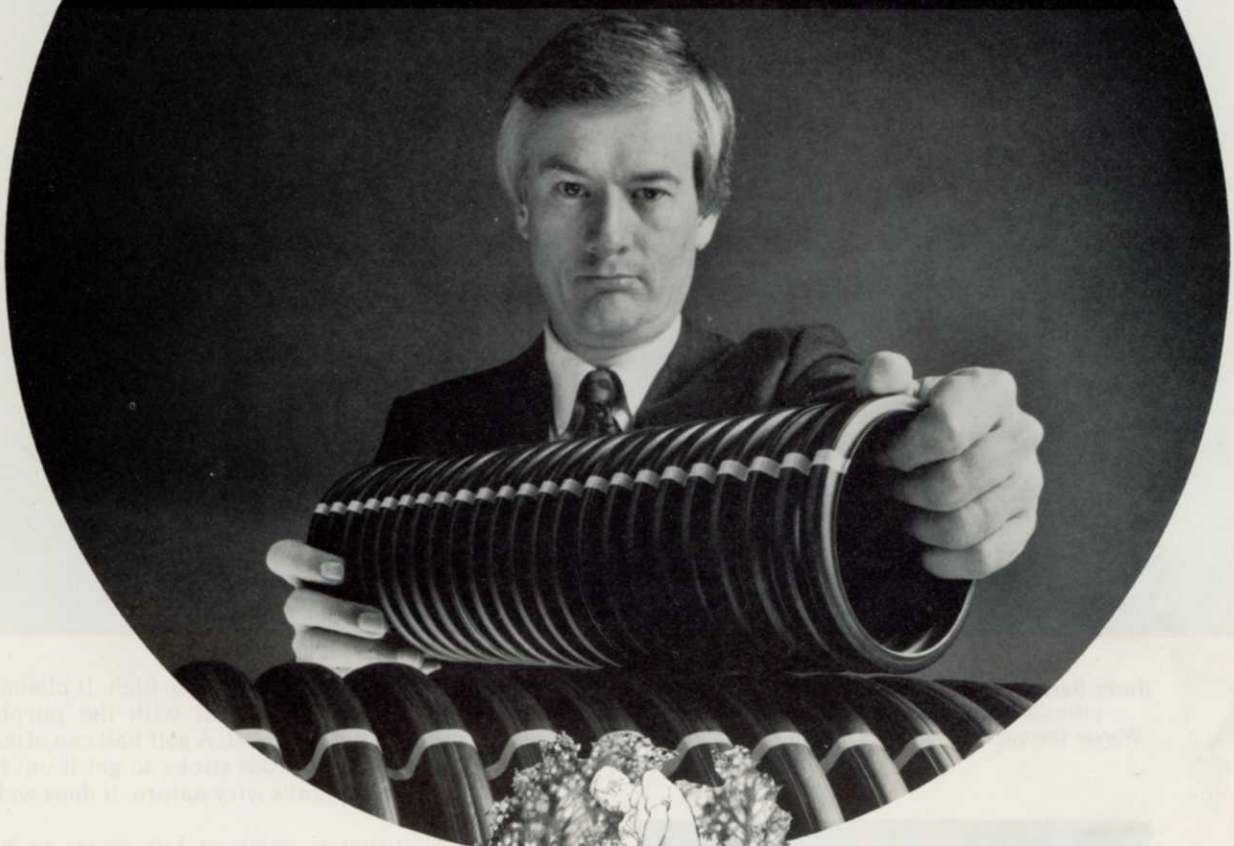

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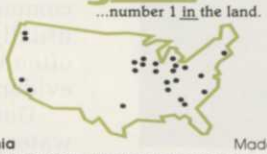

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North Berwick 16th Green (above) is formed by two plateaus which makes for some interesting putts. Worker (below) uses an alder broom to brush debris off a Gleneagle green.

the ground, usually less than six in. high. It blooms in late summer and early fall with the purple flowers making a living carpet. A golf ball can often be found in heather but the stroke to get it out is difficult due to the plant's wiry nature. It does well on hillsides.

Broom *(Cytisus)* is common but seems to be scattered as an individual plant among the more common gorse. It has almost no leaves, hence its name. It grows about three ft. high and has beautiful pea-like yellow flowers in the spring.

Roses are common but often they are the small creeping types and grow in with the grasses. Trees are almost non-existent. Occasionally there is a small maple or a wind swept hawthorn. Trees are not necessary to have a good golf course as is evident at the courses at St. Andrews Links.

Common Sea Buckthorn *(Hippophae rhamnoides)* is not seen as often as gorse but on some courses makes large clumps of brush that are 15 ft. high and almost impenetrable. It has a nice gray-green color and spreads by suckers.

The grasses are mostly fine leaved fescues mixed with some bent and sometimes a little Poa annua where there is close mowing. The rough is generally thin and easy to find a ball in, even if the seed heads may be as high as six or eight inches. The fairways are also thin and often there is moss on the ground. Divots fill in very slowly, so it is a common practice to "sand" the divots. Seed is not usually included in the "sand" because dry winds often will kill the young seedlings. There was some evidence of overseeding on fairways.

Due to a prolonged dry period and the lack of a water system, some fairway grass had been lost

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Scotland

English Hawthorn tree (above) on St. Andrews Golf Course shows effects of high winds and blowing sand, characteristics of the links area of Scotland.

Sod wall trap (left) on St. Andrews keeps sand from eroding away.

during my visit. At St. Andrews where fairway aerifying had been done, the golfers were playing preferred lies. Greenkeeper Walter Wood explained to me that the Royal and Ancient Golf Club did not have much to say about this rule being used on the course because all four courses at St. Andrews are owned by the people of the City. Walter mentioned that he had a rather large sod nursery.

Sod is used in large quantities when traps are built or rebuilt. The sod wall faced trap is the rule, not the exception. With the soil being so sandy it is the only practical way to hold a steep bank. Many of the bunkers are small and are sunken below ground level to the point that hand raking is the only way to care for them. No rakes are left on the course for golfers to use.

Golf in Scotland is for everyone not just the rich. With about the same area as the State of Maine, Scotland boasts over 350 golf courses. Many are available to the residents for free or a small fee. It does not cost very much by U.S. standards to maintain a course there. While they are trying to maintain their courses as they have always been, we in America are striving for a very high standard of excellence. The important difference of their not having motorized golf cars cannot be overlooked in regard to maintenance. Any golf course that must stand the wear and tear of golf cars must be watered and fertilized more in order to take it, however most of us are guilty of overmaintaining areas that are not in play.

Because Scotland is the home of golf, it would be good for any course superintendent to visit there to see the original golf courses from which our present day golf course has evolved. **WTT**

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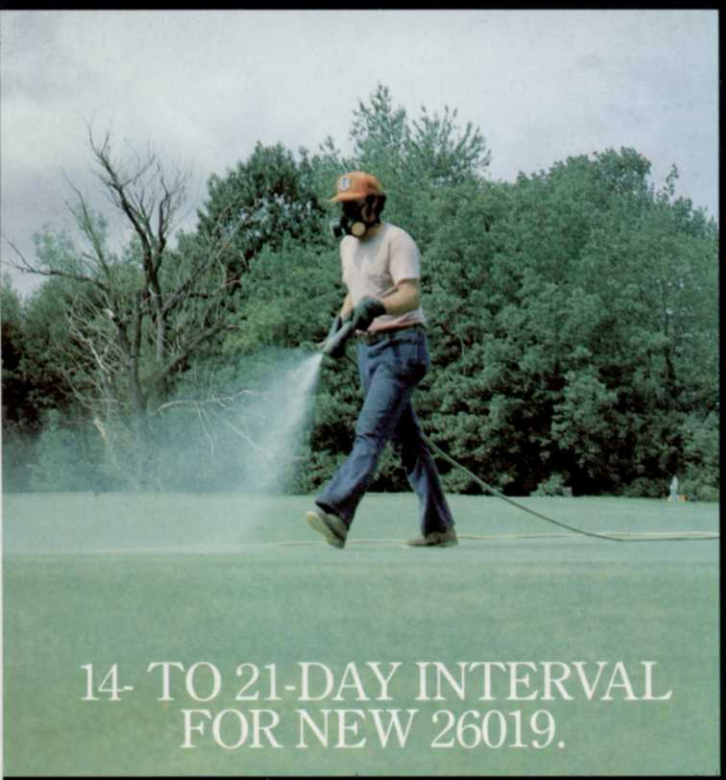

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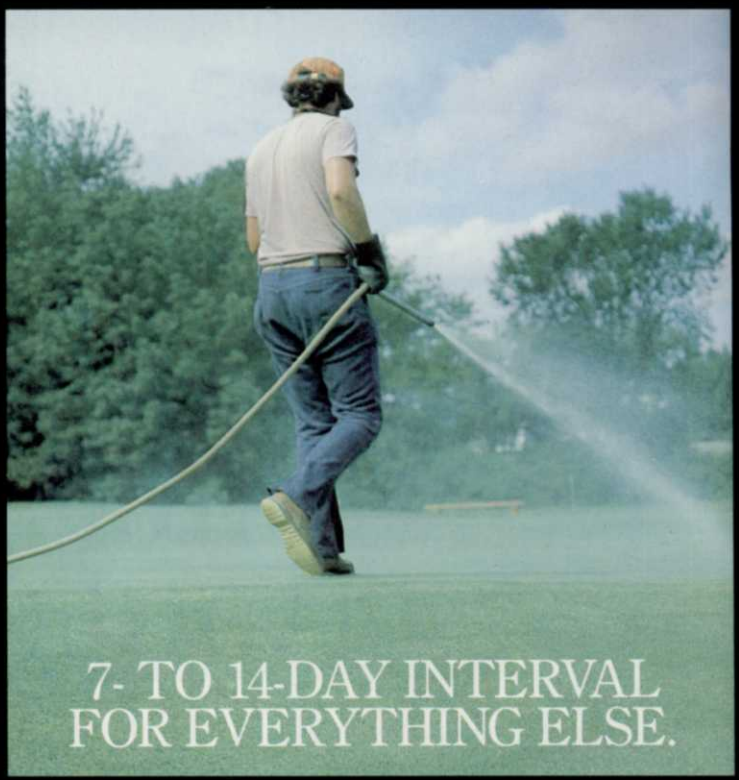

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–Bob Dickison, golf course superintendent
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"I feel very good about this product. We tested it during one of the roughest summers in my memory. I think, over a 14-day period in August, we had very close to 10 inches of rain. It was an acid test for the material. These chemicals come and go, and some of them are short-lived. But you folks have something good here. The sprayability of Chipco 26019 is very impressive. And you only need six to 10 hours of drying time, which helps a lot during rainy periods. Some other materials require at least 12 hours."

–Paul Boizelle, golf course superintendent,
and John Fenwick, foreman,
Fiddler's Elbow Country Club, Far Hills, N.J.

"We started using Chipco 26019 in June of 1977. Before we started using it, we had very little luck with our other contact and systemic fungicides in certain areas. We were applying some contact fungicides at preventative and curative rates, and still only getting two or three days control, with the usual cold fronts coming through, followed by large outbreaks of dollar spot. Since we started using Chipco 26019, we haven't found dollar spots in these areas at all."

–Randy Wahler, golf course superintendent
Glen Flora Golf Course, Waukegan, Ill.

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GCSAA WINTER CONFERENCE REPORT SESSIONS, SHOW DREW OVER 6000

The 50th International Turfgrass Conference and Show in early February had all the elements of a successful trade show, a fantastic location in Atlanta's Georgia World Congress Center, more than 6,000 attendents and 200 exhibitors, good hotels, and a speaker program kicked off with a strong motivational speech. Add the organization and service of the Golf Course Superintendent's Association of America staff and the net effect was a model trade show.

It was obvious that GCSAA had made changes from previous shows to provide a more responsive program. Technical subjects were simplified, superintendents took on a bigger share of the speaking role, and special interest topics were broken out from the rest of the sessions. The exhibit floor allowed more room for delegates to see booths and relax. Transportation from hotels was very convenient.

Session topics included landscaping, water and effluent, fertigation, turfgrass improvements, rootzones, personnel management, composting, and diseases. Sand topdressing was one of the most controversial topics. Three superintendents described their experiences with sand topdressing. Ray Knapp of Tuckaway Country Club in Franklin, WI, has found regular light topdressing with sand provides a considerable amount of sand over a year's time and eliminates thatch problems. Knapp has all but eliminated aerification of greens and has reduced application of fungicides because of the topdressing program.

Engel Miller

George Burgin of Atlanta Country Club started using sand topdressing to correct compaction problems and to reduce aerification from five times per year. Burgin stopped his topdressing when he noticed while cutting cups, that the root system extended only into the sand and not below. Burgin said, "Sand topdressing may be necessary under poor soil conditions, otherwise leave a good thing alone."

Reduced *Poa annua* population was one benefit of sand topdressing according to Charles Nolan of Inglewood Golf and County Club, Kenmore, WA. Nolan's greens were constructed in 1918 of organic soil and contain no drain tile. Nolan has adapted a topdresser so that a two-man crew can topdress all 20 greens in one morning.

Both Nolan and Knapp have customized their topdressers to improve speed of application and loading. Disturbing play with heavy applications is generally avoided by more frequent light topdressing.

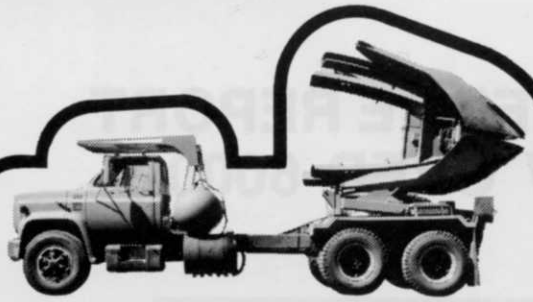
How to live with rising water costs and drought was discussed by Jim Prusa of Pasatiempo Golf club in Santa Cruz, CA. Deciding where not to irrigate because of rationing, guarding against unscrupulous well drilling companies, and handling monthly water bills of $12,000 for irrigation are just three of the reasons Prusa has been forced to make sacrifices at Pasatiempo. To compensate for the cutback in water usage, Prusa has increased aerification, sand topdressing of greens, mowing heights, hand watering, efficiency of irrigation system, use of native plants in the landscape, and use of drip irrigation. The biggest move is to arrange the use of effluent water under a publicly funded project. Not only will the state and federal governments pay the brunt of the installation cost, but Pasatiempo's water rate will be reduced by two thirds.

Effluent water must be checked for salt content and other factors which can affect plant growth. Dr. Wade Berry of the University of California, Los Angeles, suggested USDA Handbook No. 60 for ac-

Tadge

Nugent

Funk



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ceptable levels of salts in effluent water. Berry said effluent usually contains desirable elements like phosphorus and potassium, but that these chemicals will also encourage algal growth in ponds and streams and possibly on grass.

Richard Nugent of Killian and Nugent, Palatine, Illinois, said the government will allow up to 85% percent financing for distribution of effluent on land. Any system using effluent water, however, must contain storage facilities since sewage plants work all year and seasonal contracts are less attractive. Other considerations are good drainage to help leach out toxic metals, odor in early spring, and education of the golfer to the use of effluents.

Dr. Ralph Engel, professor of turf science, Rutgers University, New Brunswick, NJ, showed that ideal root growth conditions are not also ideal for appearance in bentgrass. One to three waterings per week with good soil penetration should be sufficient, Engel stated. Syringe as needed and provide proper drainage. Watering practices can effect varieties dominating. Bentgrass requires the most water, turf type ryegrasses require more than bluegrasses.

Dr. Houston Couch, author and professor of plant pathology at Virginia Polytechnic Institute, described basic characteristics of pesticide carriers. Couch said data is lacking on the effect of the amount of water carrier in a mix. However, it is known that pH of the water carrier affects the length of time a mix can be stored and remain effective. Couch said strong alkaline water will deactivate fungicides. Basically, wettable powder forms of fungicide require less material and perform more quickly and more effectively than granular forms. However, Couch said systemic fungicides have greater potential when applied in granular form.

ChemLawn Vice President Robert Miller said the pH of the water carrier can reduce the effectiveness of dylox from days to an hour. Miller said timing incompatibility also exists, such as combining a preemergent herbicide with a broadleaf contact material.

Miller made these suggestions for mixing pesticides:

—never mix pesticides in concentrated form
—never mix organic fungicides with fungicides using xylene as a solvent
—place wettable powders in tank first, the flowables, water soluble powders, surfactants, and emulsifiable concentrates.
—do jar test and test plot when possible
—when mixing pesticides with soluble fertilizer use urea in preference to other water soluble fertilizers.

Dr. Reed Funk, research professor of turfgrass agronomy at Rutgers University received GCSAA's Distinguished Service Award for his work with turfgrass breeding. Dr. Funk's program is one of the most extensive and productive in the world. A considerable amount of variety improvement and testing has taken place under Funk's direction.

Charles Tadge, superintendent of Mayfield Country Club in South Euclid, OH was elected president of the Association. Melvin Lucas, superintendent of Piping Rock Club, Long Island, N.Y. is the new vice president.

The 1980 GCSAA Show is set for St. Louis. **WTT**

ALCA honored by Houston Mayor Houston Landscape Week proclaimed

February 4-10 was proclaimed Houston Landscape Week by Major Jim McConn in honor of the 1979 Associated Landscape Contractors of America meeting. McConn noted three worthy characteristics of landscape contractors in his proclamation: "WHEREAS, the natural living environment is the basic environment of human life, in which all people function; and WHEREAS, the landscape contractor, in his daily work, installs, enhances, and maintains the natural, living environment; and WHEREAS, the leading landscape contractors from throughout the United States and abroad are assembling in Houston. . ."

Election of officers

Bill Thornton, Jr., a principal of Thornton Environmental Industries, whose main responsibility is for Thornton Landscape, Inc., was named the 17th president of ALCA. Thornton resides in Cincinnati, Ohio.

President-Elect is Wallace SaBell. He is president of SaBell's, Inc., in Lakewood, Colorado.

Other officers elected include vice presidents Ritchie Skelton, president of Duncan Landscape Associates of Vienna, Ohio, and Allen Keesen of

William G. Thornton, Jr.

Allen Keesen Landscape, Inc., Denver, Colorado.

The treasurer is Ray Gustin III, Gustin Gardens, Inc., in Gaithersburg, Maryland. David Pinkus, North Haven Gardens, Dallar, Texas, is the secretary. Ron Ahlman is the Immediate Past President.

The new officers will serve until the next meeting in February of 1980.

Awards

The Ninth Annual Environmental Improvement Awards were announced and some nineteen projects recognized at the meeting. The awards are made each year in three classifications: Environmental Grand Award, Merit Award and Award of

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Couch's Diseases of Turfgrasses is one of the best references on that subject to date. No turf library is complete without it. It provides an in-depth analysis of turfgrass disease causal organisms and control of them. From diseases caused by pathenogenic plants to viral turf diseases, Couch presents information necessary for any plantsman to achieve fine turf.
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WOODY LANDSCAPE PLANTS
Manual of Woody Landscape Plants is a valuable reference for anyone interested in woody plants. The book provides concise, factual information on common and not-so-common woody ornamentals, ground covers and vines as well as the narrowleaf and broadleaf evergreens which are adapted to Midwestern and Eastern climates.
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TREE MAINTENANCE
Tree Maintenance is an indispensible guide to anyone involved with the care and treatment of trees. All phases of tree care are described in non-technical language. The book includes a comprehensive list of effective and safe pesticides for trees.
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Simon & Schuster's Guide to Trees provides beginner and expert with a reference to 300 trees. Black and white line drawings and 350 color photographs accompany descriptive text on each tree, including etymology, habitat, description, propagation, and conditions for growth.
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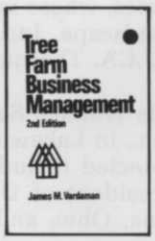

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Tree Farm Business Management covers all phases of a tree farming operation, from obtaining an accurate timber inventory to timing sales for profitable results. Budgeting, preparing scientific financial forecasts, special tax problems, and other financial matters are given thorough coverage.
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DISEASES OF SHADE TREES
Diseases of Shade Trees is an excellent introduction to tree diseases, including infectious and noninfectious. Part III, Special Topics, covers nonpathogenic conditions, disease diagnosis and living hazard-trees. The book describes the theory and practice behind maintaining a healthy tree that serves a positive purpose.
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The second edition of Soil Microbiology integrates microbiology, soil science, and biochemistry to characterize soil microflora. The revised edition adds a closer scrutiny of environmental problems, information on soil toxicants formed by microorganisms, and a chapter on microbial metabolism of pesticides.
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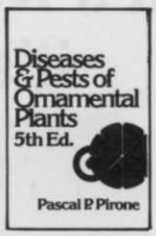

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Distinction. The entries are judged on a regional basis.

The Grand Award, the highest, was presented for the following projects:

Deere & Company Interior Atrium (Interiorscape, Region IV) Tropical Plant Rentals, Inc. Prairie View, Illinois

Hilltop Park (Landscape Contracting, Region I) A&J Shooter & Associates, Mountain View, California

Kriss Residence (Design/Build, Region VI) Alley Pond Nurseries, Huntington, Inc., Melville, New York

Peninsula Office Park (Maintenance, Region I) Green Valley Landscaping Inc., San Jose, California

Small Residence (Design/Build, Region VII) Green Brothers Landscape Company, Inc. Smyrna, Georgia

William Lackey Residence (Design/Build, Region III) Landscape Associates Inc., Little Rock, Arkansas

The award winners were selected from 90-plus entries by a panel of three judges: Jot Carpenter, president of the American Society of Landscape Architects; Kent Slepika, director of the American Society of Interior Design; and Dale Manbeck, president of the National Landscape Association.

Trade show

All of the leading landscape suppliers were set up to exhibit their products Tuesday in the Galleria Plaza Hotel's exhibit hall. A unique new ALCA program features an equipment demonstration.

Held on a bare-earth field next to the hotel, equipment manufacturers demonstrated their equipment in actual operation. Spray equipment sprayed, diggers dug, and those attending saw "the whole thing".

Education

A number of excellent speakers complimented the ALCA program. Dick Semann gave a fantastic presentation of "Communicate to Motivate". By the time Semann had reviewed the process of motivation, including effective goal setting and new concepts of motivational management within the landscape contracting field, everyone was truly "motivated to communicate".

Specialty workshops began on Thursday with sessions for interiorscape, maintenance, insurance, public relations and erosion control and revegetation. The sessions continued on Friday morning and a session for the rapidly expanding lawn care industry was added.

A record 683 landscapers attended the national meeting this year.

Those wanting to know more about the organization should write: Associated Landscape Contractors of America, 1750 Old Meadow Road, McLean, Virginia 22102.

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Century City in West Los Angeles was tagged a "modern Acropolis" by Time Magazine. This city within a city was meticulously designed to resemble what might be called the perfect metropolis — all the atmosphere and fast-paced excitement of a big city without the narrow alleys, dingy streets, and usual unpleasant characteristics of many large urban areas. It has developed into one of the most prestigious sections in the Los Angeles area both for businesses as well as luxury high-rise residential properties. One striking attribute that sets apart Century City is its beautiful landscape. Walkways, boulevard medians, and huge landscape beds are maintained with cosmetic precision.

The responsibility of keeping Century City, California, green is a complex full-time job that requires a unique problem-solving ability. Landscape supervisor John Zessau and his assistant Frank Valesquez are literally "on-call" 24 hours a day, seven days a week, to handle any landscape related dilemma that might arise in Century City. Zessau said it's not often that the job will require night calls, but if it does, "Frank and I can get to practically any location within 30 minutes from where we live . . . if a main irrigation line blows one of us is right there to handle it."

"That's one major advantage we have in our operation. We are able to provide a service that really can't be

continues on page 67

All plants grow in concrete beds above parking garages, including large coral tree.

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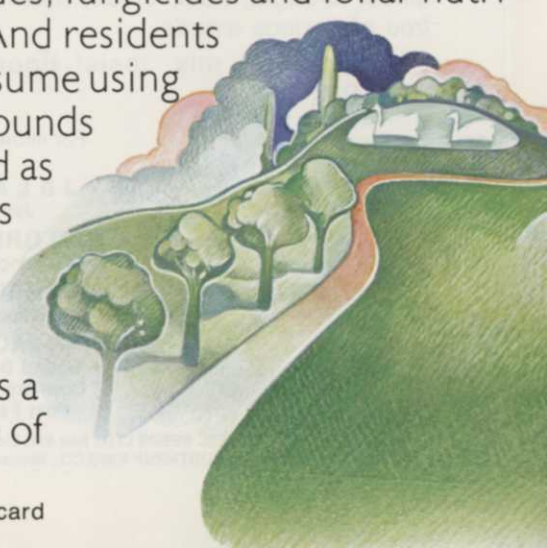
It's also compatible with many other commonly used insecticides, miticides, fungicides and foliar nutrients. And residents can resume using the grounds or yard as soon as the spray dries. There's a choice of



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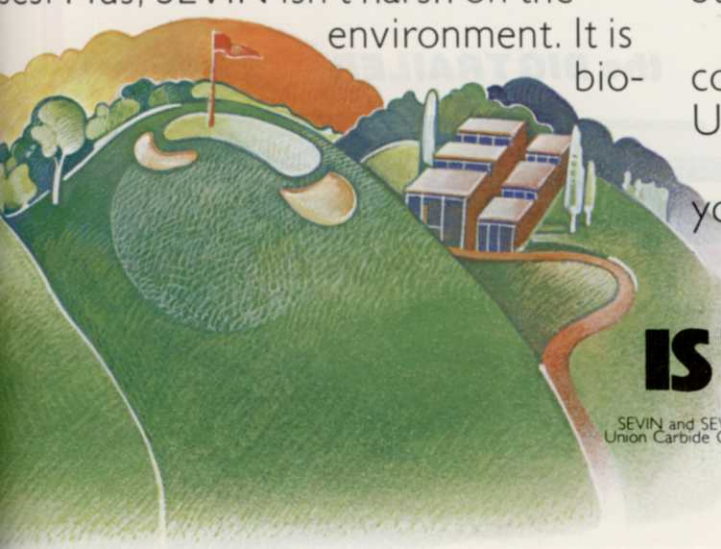
BACK.

four formulations—sprayable, wettable powder, flowables and EVIMOL® 4, a liquid blend of SEVIN nd molasses. Granules, dusts and baits re also available for certain specialized ses. Plus, SEVIN isn't harsh on the environment. It is biodegradable; and when compared with other insecticides, it ranks low in toxicity to people, animals, birds and fish.

So it's probably no surprise to hear that SEVIN carbaryl is one of the largest selling insecticides in the United States today.

For more information about SEVIN, contact your pesticide supplier or Union Carbide at the address below.

Make SEVIN carbaryl insecticide your answer to pest control too.



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TRAILEVATOR the hydraulic elevating trailer that lifts its own load in seconds

Trailevator lowers to ground level for fast, 'roll aboard' loading, then lifts its own load to hauling position in seconds. Lowers and lifts without uncoupling from towing vehicle. Saves time, saves money. Four models, two capacities: 3000 lbs. and 2000 lbs. Bed sizes up to 5′-10″ x 10′.

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MODEL T5
Double Axle

Drop axle tilt type trailer handles loads up to 5000 lbs. Easy one-man operation. Tailgate serves as self-adjusting access ramp, provides smooth, gradual incline for fast ground level loading. Bed returns to hauling position when loaded; size: 5′ 10″ x 12′.

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Handles loads up to 3000 lbs. Bed size: 5′ x 8′. Heavy-duty drop center axle; 13″ wheels. Tilts to ground level for easy loading.

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Our 'big daddy' tandem model gives you plenty of size and capacity for hauling big, bulky loads. Engineered for safe, dependable trailering, with an all-steel reinforced frame and solid, heavy-duty cargo deck. Standard equipment includes hydraulic surge brakes, safety chains, and stake pockets. Bed size: 79½″ wide x 16′ long.

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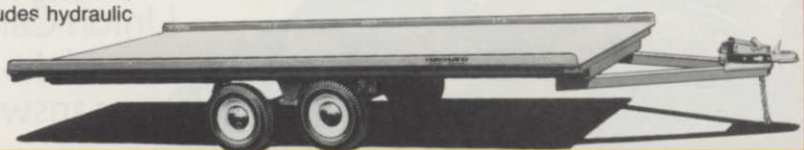

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provided by an outside source. Everything here is done "in-house". We contract out for very few jobs," Zessau explained. His 15 man staff of full time employees gives Zessau the flexibility to properly manage this highly complex landscape system.

Caring for countless flower and plant beds, 12 acres of lawn, and more than 25 miles of walkways and roadsides, is an incredible task by itself. But what makes the undertaking even more difficult, is that nearly all of the horticultural environment of Century City is artifically created. It is one of the largest "container grown landscape" projects in North America. Underground parking lots catacomb most of the complex, requiring that much of the native soil be removed. "When a new high rise or other major structure goes in, that's when we get into the act. Quite often the planting areas around these new developments are nothing more than huge concrete planters," Zessau noted.

Continues on page 70

Exotic plants flourish in contained plant beds.

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Power Source: 18 horsepower OMC engine, tightly compartmentalized. Ground speed 0 to 22 mph.

Braking: Hydraulic internal expanding.

Payload: 1000 pounds.

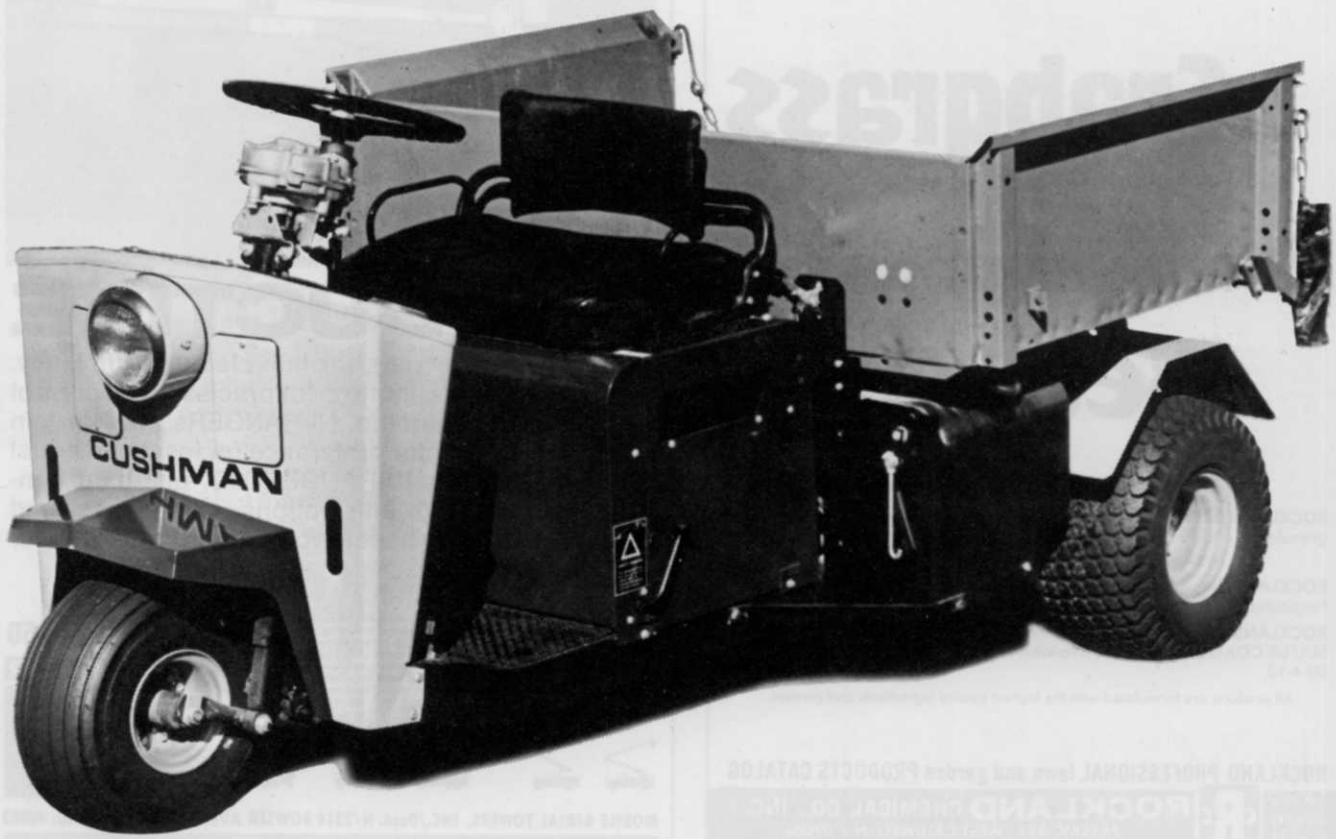
Suspension System: Torsion bars, leaf springs, front and rear shocks.

Dump Construction: Single wall.

Headlights: Single.

Seating: Single seat for one passenger with back rest and hip restraint.

Price: Virtually the same.



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Headlights: Dual lights for greater night vision.

Seating: Dual seats for two passengers with individual back rests and hip restraints, constructed for larger men, greater comfort.

Price: Virtually the same.

Summary: E-Z-GO carries a greater payload, is easier to maintain, is larger, more durably built, and safer with a wider wheel base. E-Z-GO uses top quality components from companies such as Bendix, Borg Warner, Dana, Onan, and Rockwell International.
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Century City

Extreme care is required when creating these flourishing gardens over concrete and steel. "Many are awkwardly located in and around structures. Once the landscape job is completed, we can't get in there again with heavy equipment. So if a tree dies or there is a drainage problem, we're in a world of trouble," Zessau continued.

Drainage is the most important consideration in these super containers. "Without a proper drainage system we'd lose the plants to rotting and disease," he related. "The bottom or first layer of the planter consists of rock with drainage outlets underneath. The middle layer is made up of sand and above that is the topsoil. The topsoil is a 60-40 mixture of organic matter to sand." Zessau explained that planter depths vary with the deeper ones containing as much as eight feet of topsoil and sand — enough to support large trees . .

While drainage systems and growing mediums have been successfully developed and maintained and few plants have been lost at Century City, one factor caught Zessau and his crew off guard. That factor was wind.

"Due to the proximity of this project to the Pacific Ocean, sometimes when the wind rushes between these buildings, we get a venturi effect," Zessau observed. "This effect is similar to a vacuum and can be very harmful to anything not secured, especially young trees," Zessau added.

Century Plaza Towers are the two largest buildings in Century City. These twin structures, standing side by side, have caused gusting winds of up to sixty miles per hour. Zessau's crew planted some sturdy young *Ficus* in the Plaza between Century Plaza Towers and the ABC Entertainment Center. These trees were then bolted into the concrete with sturdy guy wires to insure their growth and safety. The guying and staking of all trees and large plants have become an important commodity in the landscape business at Century City. "And we've learned that pruning trees (a regular function) is unnecessary in some locations, since the wind does it for us," he said.

Another problem caused by the wind is irrigation. The only means considered feasible in the initial plans was the overhead sprinkler.

Continues on page 72

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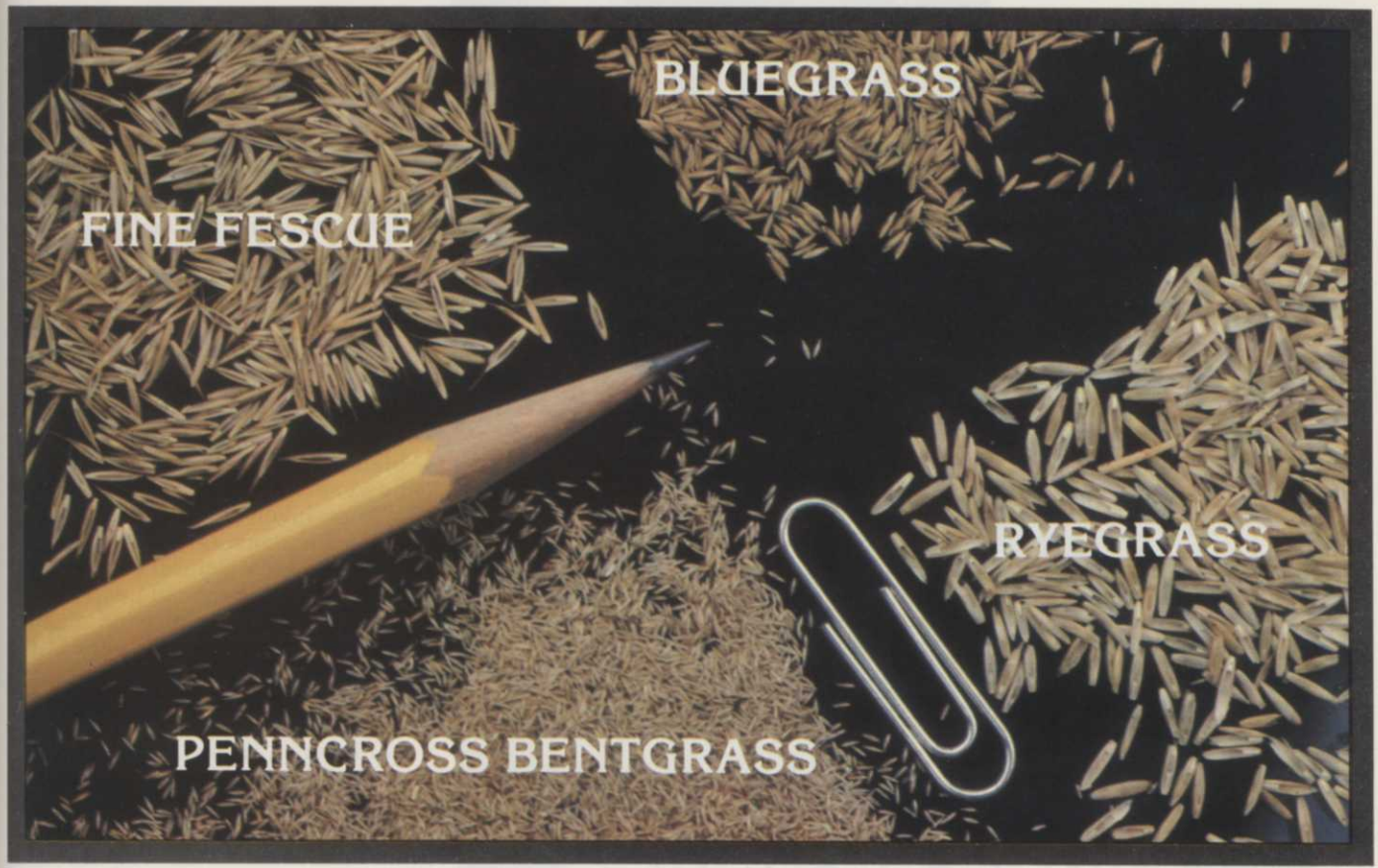
PENNCROSS makes a POINT



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But, did you know, Penncross costs less, seed for seed, than annual ryegrass? For example, if you purchased a pound of annual ryegrass (approximately 200,000 seeds) for 30 cents, you would have to pay $12 for as many ryegrass seeds as you would receive in one pound of **Penncross** (approximately 8,000,000 seeds).

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Be PENNy wise... PENNCROSS

John Zessau

Century City

But with winds in some areas gusting to 60 miles per hour, this hardly seemed logical. "So," said Zessau, "what we've done in these areas is to switch from overhead to drip irrigation systems. Slow release hoses that run along the ground emit just enough water for the plants' needs," he said. "Being a ground level watering device negates the wind's effects."

Century City's overall landscape design incorporates countless varieties of flowers, bedding plants, shrubbery, lawns, and trees. Wind is obviously a factor dictating what plants go where. Zessau pointed out, however, there are many other factors involved. Shading patterns must be considered. In such an intensive architectural environment, some areas are shaded nearly all the time by one structure or another. Plants adaptable to very little sunlight must be utilized once shading patterns are established. Another factor is location. Some landscape areas are not easily accessible, so plant variety has been chosen accordingly. In these difficult-to-reach areas hardy plants are planted, which require little attention.

Labor savers

As development continues in Century City and landscaping needs increase along with it, Zessau says he has been able to keep his work force at a minimum through the judicious use of fertilizers and chemicals. He says, "judicious", because when spraying insecticides, for example, he backs up his decision to spray with a recorded schedule of plant checking and insect observation. "Many people still think you should spray on a calendar basis. So when aphid season comes along they spray. I don't agree; I only spray when I know there's a heavy infestation." He also knows, however, that failure to treat for aphids or thripps when necessary can require expensive replacement of plants.

The two chemicals that Zessau claims are absolute necessities in his operation are growth retardants and herbicides. "They're the real labor savers." With ivy, for example, he can get away with much less pruning than is normally required through the use of an effective growth

Continues on page 75

Beautiful results! How often have you tried a herbicide only to end up with poor control or damaged turf? No longer. Banvel® 4S, and Banvel® +2,4-D give you economical control of more than two dozen difficult weeds. Weeds that other herbicides often miss. The translocating action of Banvel® attacks the entire weed, roots and all, to get at deep root and regrowth problems. True season-long herbicides, they can be used in warm or cool, wet or dry weather, and store through the winter without loss of potency. They mix readily in hard or soft water, and may be applied with conventional spray equipment. **Banvel® 4S for tough weeds, Banvel® +2,4-D for pre-mixed chemicals and broader spectrum control of broadleafs.** You get beautiful results, at a cost you'll find pretty attractive, too!

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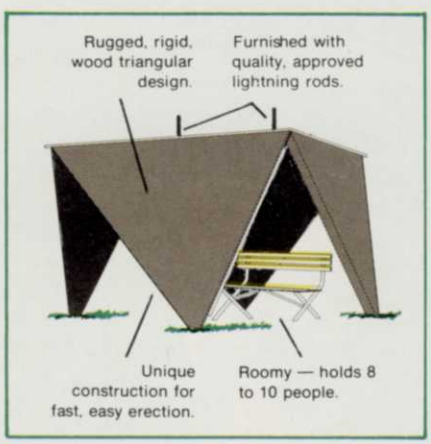
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STANDARD GOLF Pro-Line

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How Roundup® helped Jim Siegfried renovate this fairway in days, without closing it for one minute.

Take a good look at this good-looking fairway.

Last fall, Jim Siegfried found a way to clean it up, without tearing it up—at the height of his club's busy season. With Roundup® herbicide by Monsanto.

Jim is the Greens Superintendent at Losantiville Country Club, Cincinnati, where bermudagrass had become a serious problem on the 18th fairway. To control it, Jim applied Roundup once—while the weeds were still actively growing—right at the start of the Labor Day weekend.

"That's really 'prime time' here," Jim told us. "But after we applied Roundup, we kept the fairway in play the whole weekend, and after. The members played right over it, with no problem."

Since Roundup has no residual soil activity, and won't wash or leach out of treated areas to injure desirable plants, Jim simply took normal precautions against spray drift—and didn't worry about damaging desirable vegetation along the fairway.

Even better, he was able to reseed right into the dying bermudagrass only 7 days after applying Roundup—without loss of playing time or inconvenience to the membership.

Reinfestation won't be a big problem for Jim, either. He knows that Roundup destroyed the rhizomes of the treated weeds, helping prevent their regrowth.

Jim thinks he'll use Roundup again this year—and apparently some club members hope so, too. "As soon as they saw how good this fairway looks, some of the members started asking when I'm going to do the same for #10, where we have some more bermuda. I'll probably tackle that with Roundup this fall."

If controlling many tough emerged weeds and grasses is a problem for you, see your local Monsanto representative or chemical dealer soon for your supply of Roundup.

Roundup. It worked for Jim Siegfried. It can work for you.

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Monsanto

There's never been a herbicide like this before.

ALWAYS READ AND FOLLOW THE LABEL DIRECTIONS FOR ROUNDUP.

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retardant. "Instead of having to prune mountains of ivy every month we can reduce the number of prunings by a third," he said.

Because such a good horticultural environment is created for plants in Century City, weeds also flourish. Besides heavily infested plant beds, Zessau is constantly plagued with weed growth in expansion joints, where the asphalt on the streets meets the curb, at the divisions and cracks in sidewalks, and so on. "We use Round-up herbicide on a regular basis to kill these existing weeds," he related. "In our annual beds, however, we like to use a pre-emergence herbicide to hold weed populations down over long periods. We've been most impressed with Devrinol (Stauffer Chem. Co.) herbicide because it keeps weeds back for so long in our beds. It keeps them clean for the whole season. We've also had a lot of trouble with weeds growing in the ivy," he continued. "When we have to renovate (cut back) the ivy, sunlight gets in and promotes weed growth. What we've done is spray devrinol down through the ivy after renovation. We've also been able to save water here, because we don't have that heavy thatch in the ivy to absorb all that moisture."

In Zessau's comprehensive fertilizer program he begins by categorizing the various landscape beds in the development. He explained, "We categorize the different planters by location and accessability. In the hard-to-get-to areas we apply a slow-release type of fertilizer, while the easily

Continues on page 87

Turf area on edge of complex.

HOFFCO ™ Whizz Witch

A tough 85cc engine stands behind trimming head and 2 cutting blades.

- **Tri-line, heavy duty monofilament trimmer head.**
- **11″ Tri-Kut weed blade cuts heavy weeds, briars and brambles.**
- **10″ 44 tooth brush blade (optional) cuts up to 3″ diameter saplings at ground level.**

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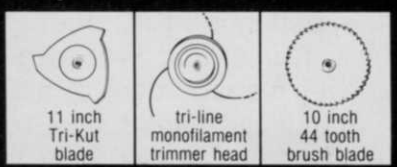
Offers the same equipment package, but the trimmer head is optional.



The 2 cycle, 22.5cc engine, can be operated in any position. Total wgt. 13½ lbs.

1. Monofilament trimmer head
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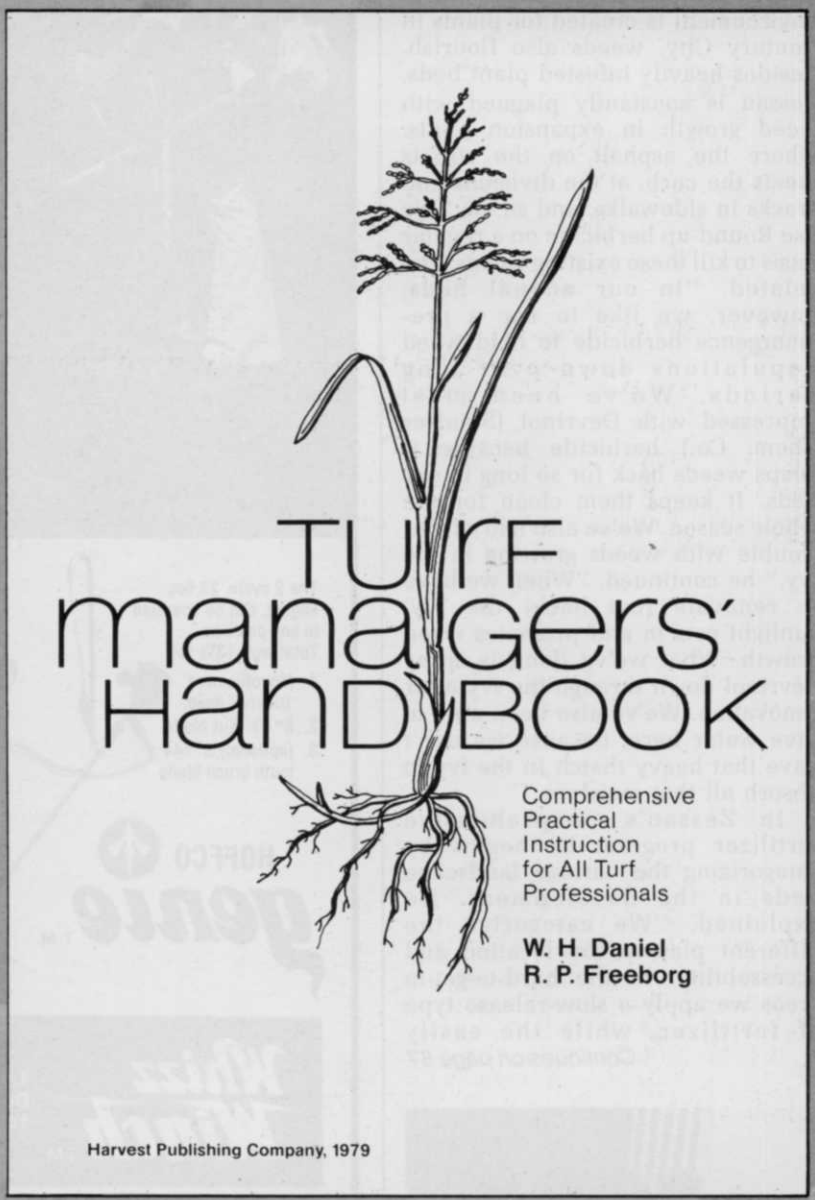
Purdue University's turf experts, Dr. William H. Daniel and Dr. Ray P. Freeborg, have coauthored a comprehensive, organized approach to learning turfgrass science and care. Based upon years of teaching experience at Purdue, Drs. Daniel and Freeborg cover management of all major turf uses today. The book, a valuable reference, includes specifications for planting, fertilizing, regulating growth, mowing, and other maintenance practices. Whether for quick reference or as a basis for all turf knowledge, the book will be among books by Couch and Beard on the reference shelf. The book is 420 pages and contains 16 pages of color illustrations.



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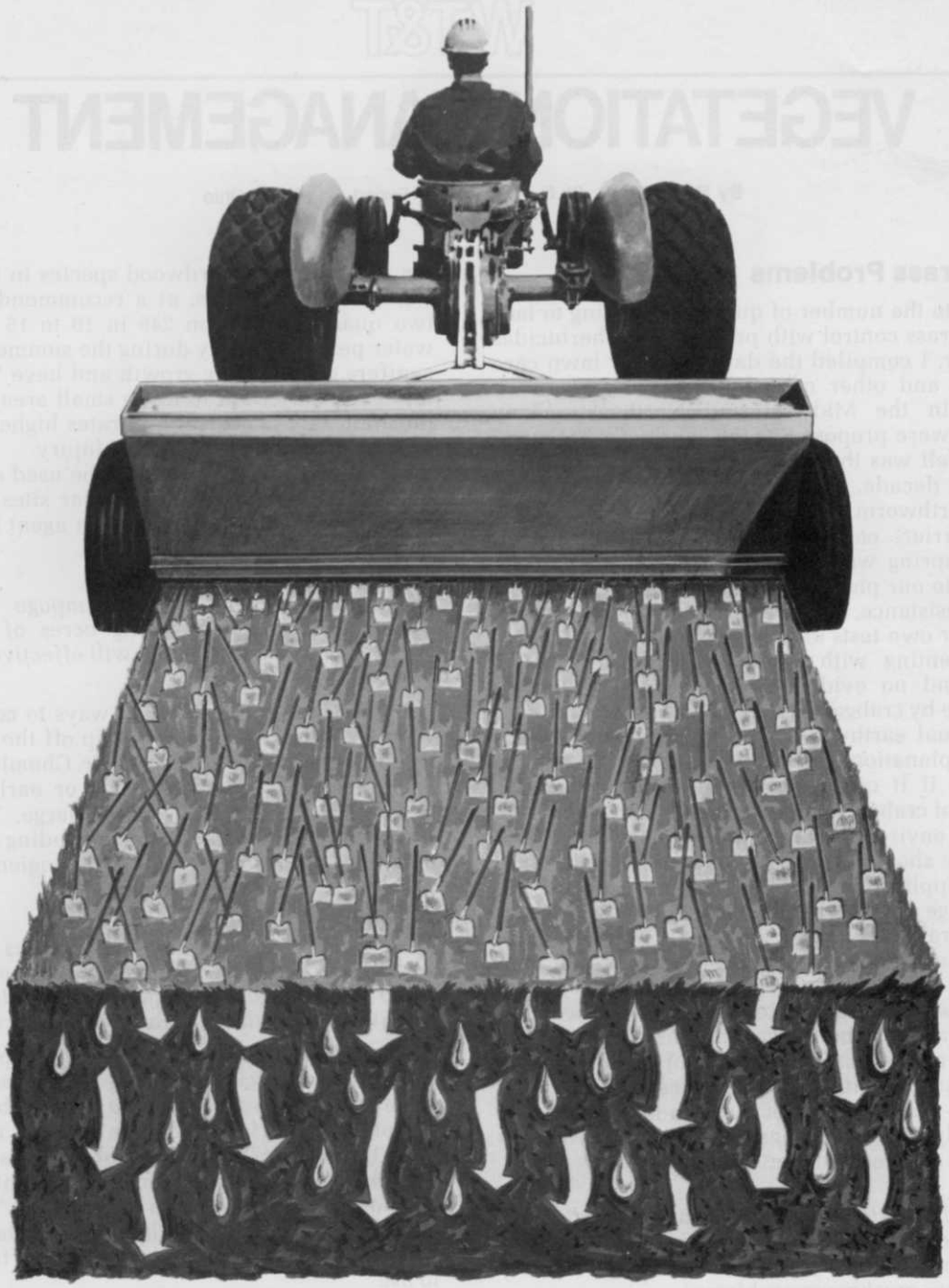

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VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Crabgrass Problems

Due to the number of questions relating to lack of crabgrass control with pre-emergent herbicides last year, I compiled the data from our lawn care division and other contributing lawn care companies in the Midwest and Northeast. Many reasons were proposed as the cause of what many people felt was the worst infestation of crabgrass within a decade. Among the suggestions were unusual earthworm activity that disrupted the herbicide barrier, early crabgrass germination even though spring was delayed (an 18-day delay according to our phenological data), developing herbicide resistance, and late germinating crabgrass.

In our own tests and those of other researchers experimenting with pre-emergent herbicides, I could find no evidence of increased herbicide tolerance by crabgass seedlings.

Unusual earthworm activity may be a reasonable explanation in localized areas, but it is doubtful if it could explain the widespread incidence of crabgrass reported to me last year.

If the environment were the primary causal factor, there should be some consistency relating the time of application with the degree of control. The percentage of lawns reportedly with unsatisfactory crabgrass control was more or less constant throughout an application period from March 24 to May 10.

In short, I could not find sufficient evidence to support any of the suggestions as the probable cause of an increased incidence of crabgrass. It is quite possible that other companies will find — as we did — that when all of the data is accumulated and analyzed, the crabgrass infestation was not nearly as severe as earlier suspected.

Q: *To what extent has used crankcase oil been utilized to sterilize soil under gravel beds (in lieu of utilizing plastic — fiberglass mats — herbicides) — are there any known problems?*

A: If you are referring to the use of crankcase oil for weed control in landscape plantings, we have not attempted this and could find no references. I would suspect that if the oil is concentrated enough to control weeds, it would also cause injury to ornamentals, particularly those that are shallow rooted.

If you are referring to oil in gravel beds without ornamentals, it should be successful. Crankcase oil has been used in gravel driveways for total plant control.

Q: *I have a tree plantation of 3-8' pine and spruce trees. Brush (poplar, willow, etc.) has grown to the same height among these trees. Can you recommend a selective herbicide that will kill the brush but not harm the pine and spruce trees?*

A: Esteron 245, a formulation of 2,4,5-T, is labeled for the control of hardwood species in forest conifers, including pines, at a recommended rate of two quarts of Esteron 245 in 10 to 15 gallons of water per acre. Apply during the summer after the conifers cease spring growth and have "hardened off." You may want to test a small area as the application rate is critical and rates higher than two quarts/acre may cause conifer injury.

2,4,5-T formulations cannot be used around the home, recreation areas or similar sites. Read the label and consult your extension agent for recommendations to fit local conditions.

Q: *Bagworms went on the rampage in certain regions last year, devouring acres of greenery. What are the chemicals that will effectively control this pest?*

A: One of the most effective ways to control bagworms on small shrubs is to clip off the bags from infested plants during the winter. Chemical control is most effective in the spring or early summer before the larvae become too large. There are many effective chemicals, including carbaryl, diazinon, acephate or *Bacillus thuringiensis*, which provides a biological control.

Q: *I recently heard of a number of trees dying on a golf course built over an old land fill and understand that it is gas that is killing them. Is research relative to this subject being conducted currently?*

A: Dr. Franklin B. Flower, extension specialist in Environmental Science at Rutgers University, New Jersey, has been investigating species best suited for planting on land fills. He and his colleagues have travelled extensively in order to assist others in making on-site evaluation of the potential for gas vegetation growth problem on land fills. They have research plots on land fills and the data obtained will eventually show the best planting techniques to use.

Q: *After reading the article (October 1978) on fertilizing trees, I wonder what liquid N-P-K and/or micronutrient fertilizer solutions are available. I use a high pressure piston 10-gpm, 110-gallon tank sprayer for spraying trees and lawns. I also use an injector probe made from ½-inch steel electrical pipe to inject fertilizer into the soil. What fertilizers are available to avoid minimal wear on my sprayer?*

A: Liquid, soluble fertilizers cause less abrasive injury than liquid suspension fertilizers to pumps and spray equipment, which is your primary concern. However, suspension fertilizers are less corrosive to metals, have a lower "burn" potential on plant roots and have a longer residual in the soil.

Continues on page 83

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CIL Sulphur Coated Urea is being tested against other controlled release nitrogen fertilizers at 14 different universities in the U.S. and Canada. Photo above shows one of the test sites with CIL Sulphur Coated Urea treated grass in foreground.

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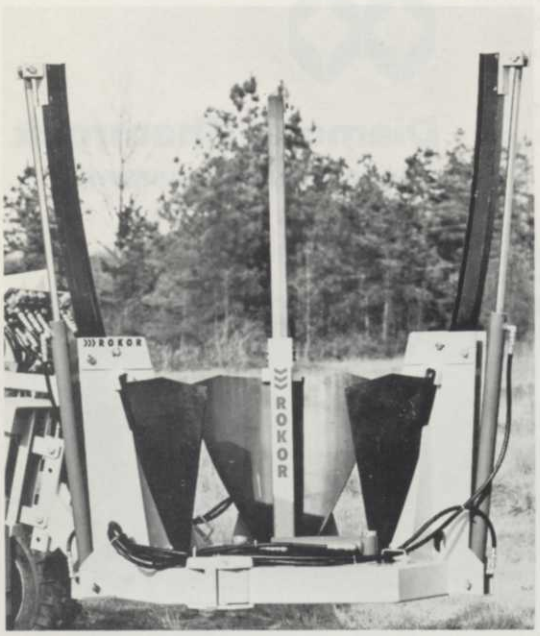

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There are a number of soluble N-P-K formulations on the market including Prolawn, Sta-Green and Rapid-Gro. Most of the soluble fertilizers are formulated from the same nutrient sources and, therefore, give similar results when applied at the same rate. You should price the fertilizers and compare the cost per nutrient pound.

Micronutrients are available in the chelated form as Sequestrene and as soluble salts such as ferric nitrate and magnesium sulfate.

Q: *What is the composition of Wilt-Pruf? Can this product serve as winter guard?*

A: Wilt-Pruf NCF is a low molecular weight, Lewis acid catalyzed polymer of beta-pinene. It is chemically di-l-p-Methene.

Wilt-Pruf reduces tissue desiccation and is labeled for winter protection.

Q: *I need the name and vendor of a product that will help to eliminate Christmas tree poaching. I understand that such a spray is available that will not harm trees but will give off an offensive odor when the tree is placed indoors.*

A: You are probably referring to the deer repellant which gives off an offensive odor at room temperature. Such a product was used by the Somerset County Parks Commission in New Jersey this past winter. Contact Jack Moody, secretary-director of the commission, for evaluation of the product. **WTT**

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Davey announces a two-week seminar for urban forestry foremen.

The Davey Horticultural Institute in Kent, Ohio, will conduct a series of special two-week courses in tree-care maintenance operations beginning May, 1979. Any federal, state, municipal or institutional employee can enroll. Since 1904, Davey has been conducting formal training programs on tree-care maintenance.

You will be able to expand your knowledge in all phases of tree maintenance through lectures, demonstrations and concentrated work in the field. You're assured of ample individual attention because the student/instructor ratio will be 8 to 1, or less.

Subjects covered will include: • Pruning • Climbing • Transplanting • Cabling • Tree insects • Fertilizing • Bark tracing • Girdling roots • Spray equipment • And much, much more

Your $575 tuition covers all reference books, study pamphlets, supplies, equipment rental fees, materials for field operations and insurance.

Low-cost accommodations are available at Kent State University's Korb Guest House. The Kent area has a number of inexpensive restaurants. Regular limousine service links Cleveland-Hopkins Airport with the Institute.

Classes are limited to just 24 students on a first-come, first-served basis, so we urge you to act today. For complete information, please contact:

Richard E. Abbott
Vice President, Davey Environmental Services
117 S. Water Street, Kent, Ohio 44240

Tel: (216) 673-9511

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PROSCAPE

By Michael Hurdzan, Ph.D., golf course designer and consultant

NOTE: In the January 1979 issue of WTT, I advised you on a late fall fertilization to be applied in late November and early December. Although I have seen good results with fertilizer applications during this period, I believe that you will have better results with a mid-October application instead. This change in thinking is basically a product of many discussions with turf managers and researchers this fall and winter.

Q. *I have heard and read many viewpoints on thatch and mat in turf and in almost every instance the definition of the two has been reversed. Please give an example and illustration of each (thatch and mat). Also, has any information on the use of Posan to retard seeding of Poa annua* on greens been compiled, or is Posan strictly for fairways? Oxnard, CA

A. The difference between mat and thatch is only in degree. The term mat is meant to connote about ¼" or less of undecomposed stems, leaves, stolons or rhizomes, that accumulate between the soil surface or rootzone and the living plant. In most instances mat is a desired condition because it provides resiliency to the turf and thus lessens mechanical damage to the plants, resists compaction of underlying soils, and reduces rapid evaporative moisture loss from the soil. In short it is a thin manageable, thatch layer. On the other hand, thatch is the excess accumulation of the same dead plant parts which results in all the commonly associated, and too well known problems.

The use of Posan should be confined strictly to fairways and a Bensulide based product used on greens. Check the September 1978 Proscape column for elaboration.

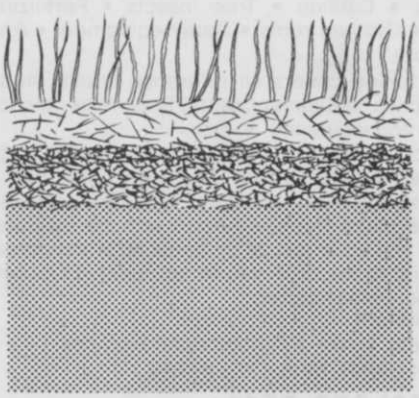
Q. *Is there a school in the U.S. where you can take a landscape architect course by corresponding? B.H., Accomac, Va.*

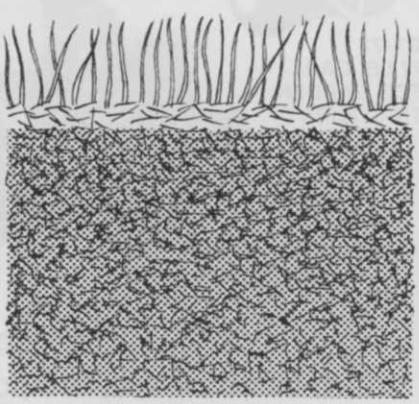
A. Not that I know of and if there was such a course I would advise you not to waste much money or time with it. The reason for such a strong negative reaction is that to learn landscape architecture skills by correspondence is analogous to learning medicine by mail. To do landscape architecture (not to be confused with landscape design) requires using: Detailed problem and situation analysis; applying a suitable design process; formulating and presenting the design in standard architecture language; selling the design intention from a basis of history, economics and limitations using many graphic skills; and then being able to technically advise and inspect the work during construction phases. The really proficient landscape architect also has the ability to advise on long term maintenance of the design features to insure it remains as he planned it. To acquire these basic skills requires 4-5 years of total immersion in a classroom/studio situation where you learn most from your fellow classmates, much from the professors and critics, and some things from your own efforts. This program is very intense and requires extreme discipline of mind and body to endure the rigors of a program that sets high standards in such diverse subjects as:

1) History
2) Basic design
3) Graphic and design language
4) Architecture appreciation
5) Problem analysis and construction methods
6) Communicative skills
7) Plants, plant materials, and construction materials
8) Advanced math or computer science.

To dramatize the dedication that such a program requires, it is not unusual for many large universities to start with 200 L.A. students as sophomores and only graduate 40 or 50 of that group. The benefit to the general public is that this harsh selection process insures only qualified practitioners.

In addition, most states require that a landscape architect be registered within that state and often this requires extensive testing. To pass these rigorus tests nearly mandates a formal college program. Check Proscape in the January issue of WTT for more information on available schools.





Thatch, as illustrated on the left, is an excessive accumulation. Mat, illustrated on the right, is an acceptable amount of thatch that actually enhances the microenvironment. (Photo courtesy of *Turf Manager's Handbook* by W. H. Daniel and R. P. Freeborg.)

ARBOTECT® 20-S
The strongest Dutch elm disease protection you can give a tree.

ARBOTECT 20-S fungicide helps make it possible to save many elm trees that otherwise would be lost.

Injected into the trunk of the tree, ARBOTECT builds a barrier against Dutch elm disease inside the tree itself. It helps prevent the disease in healthy elms, and can often save infected trees if they are treated early enough.

Used along with sanitation, insect control, and root graft elimination, ARBOTECT can significantly improve the effectiveness of a Dutch elm disease control program.

ARBOTECT differs from other elm fungicides in several important ways:

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- Thiabendazole, the unique active ingredient in ARBOTECT, is highly effective against *Ceratocystis ulmi,* the fungus that causes Dutch elm disease.
- Even though it is more effective and convenient, ARBOTECT costs about the same to use as other elm fungicides.

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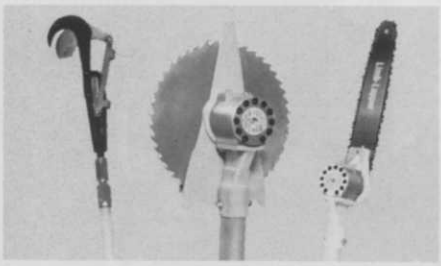

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Nurserymen's Association and the Columbus Landscape Association. Dr. Chadwick has organized a steering committee representatives from the Kiwanis Club, The Ohio State University Horticulture Department, Secrest and Dawes Arboretums, and the Metropolitan Park District of Columbus, Ohio.

A master plan is being proposed that will incorporate the best in new varieties of ornamental plants within the natural beauty of Inniswood Gardens. Some plantings are scheduled during 1979, with the greatest emphasis during the 1980 and 1981 planting seasons.

NURSERY

HRI approves funds for fifteen projects

The Horticultural Research Institute, Washington, D.C., recently approved funding for 15 Richard P. White $500 Research Grants for 1979.

Any organization conducting nursery research is eligible to apply including state and federal research laboratories, land grant universities, forest research stations, and arboreta.

Recipients are selected on the basis of their responses on a one-page questionnaire. The only restrictions are grant recipients must agree to use the money to purchase supplies or equipment to continue or complete a project and they must report the progress and/or results of their research to HRI for distribution to the nursery industry.

Grant applications are available from HRI, 230 Southern Building, Washington, D.C. 20005, and must be returned by May 1.

In related news, an expanded edition of the HRI publication New Horizons is now available. The booklet has been expanded in 1979 to include reports from HRI contract researchers and Richard P. White grant recipients.

Cost of the 40-page publication is $2.50 per copy for educators and $4 per copy for others from HRI, 230 Southern Building, Washington, D.C. 20005.

RESEARCH

Degassed water shows growth advantage

Two Russian scientists have discovered that "degassed" water promotes increased growth in plants. Igor and Vadim Zelepukhin, of the Institute of Fruit-Growing and Vine-Growing of Kazakhstan, Kazakh, U.S.S.R., accidentally discovered that water which is boiled and cooled rapidly is several times more biologically active than meltwater.

Test showed that seeds soaked in the "degassed" water produced increased yields and some crops watered with it produced 10 to 12 percent higher yields.

The researchers said higher yields result because "degassing restructures" the water molecules so they are in the proper pattern to pass more readily through cell walls and be utilized immediately in vital cell functions.

The "degassing" process involves boiling the water, thereby removing dissolved gasses, and quickly cooling it, under airless conditions, so no gasses can re-dissolve into the water.

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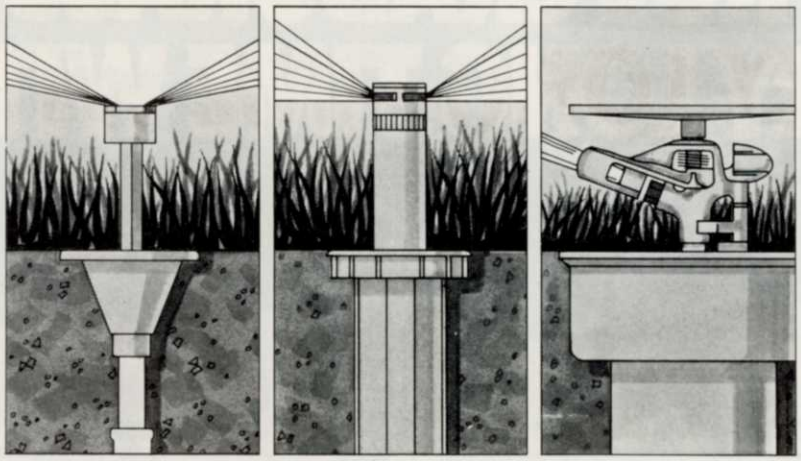

From residential to light commercial turf installations, Champion has a pop-up to do the job! When you compare the cost, precision construction and performance, you'll buy Champion. The 18HP (2" pop-up), the P180 (2½" pop-up) and the 6178 Impulse pop-up are just three of over one-hundred fifty sprinklers, valves, controllers and accessories featured in the new Champion, full-color catalog. Ask for your free copy.

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Here is the ideal solution for hedges and screens. TALLHEDGE™ grows fast and thick with minimum care. It matures into upright four-foot wide columns, twelve feet high with lustrous dark green leaves. If desired it can be shaped into a formal hedge. During the summer months attractive berries add color.

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accessible places are treated bi-monthly with a quick release fertilizer. The slow release is applied once a year and then we have intermediate fertilizers for areas scheduled for treatment three or four times a year." Zessau's fertilizer decisions are not made by guesswork, though. His soil ammendments are scientifically formulated from soil samples and lab analysis done by O. A. Matkin, Soil and Plant Lab, Los Angeles. Zessau credits Matkin with a major role in the overall up-keep of plant nutrition at Century City.

Decisions concerning fertilizer breakdown and concentration are only one aspect of Zessau's soil amendment program. Fertilizer applications are common at Century City. Fertilizers are applied when needed and Zessau has learned that when spraying any chemical in an urban area people are inevitably going to be concerned. "I don't care if you're spraying water — somebody is going to get uptight about it," he said. Zessau has found that a little psychology goes a long way; instead of applying liquid fertilizers, he's switched to granular mixes. "Oddly enough, people don't look twice if you're applying a granular," he observed. "The only time we ever apply a liquid fertilizer is in extremely hard-to-get-to places where we sometimes inject the fertilizer into the sprinklers. This can also be a tremendous labor saver when you consider the fact that we don't have to send a man carrying a 100 pound bag of granular fertilizer climbing up into some awkward bed."

Sprinkler systems, both overhead and drip, are all hooked up to automatic timing devices which saves Zessau's maintenance crew countless hours. Taken a step further, Zessau explained that some of the development's sprinklers are even more sophisticated — triggered automatically when tensiometer readings in a given bed fall below a certain moisture level.

Landscape technology obviously has come a long way from the days of peat moss and a hoe. For John Zessau, it's taken what would have been a horticultural pipe dream twenty-years ago and made trees grow over six story underground parking lots, made roses flourish in steel and concrete; and helped ivy thrive for miles over a thin layer of sand and backfill mix. **WTT**

WE CONTROL CRABGRASS, G
FOR A VERY LONG TIME WITH

MARCH

SUN	MON	TUE	WED	THURS	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

APRIL

SUN	MON	TUE
	2	3
8	9	10
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29	30	

MAY

SUN	MON	TUE	WED	THURS	FRI	SAT
		1	2	3	4	5
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27	28	29	30	31		

JUNE

SUN	MON	TUE
3	4	5
10	11	12
17	18	19
24	25	26

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Now, in established perennial Bluegrass, Bermudagrass, Perennial Ryegrass and St. Augustinegrass turf, Chipco® Ronstar®G gives effective control of Crabgrass, Goosegrass and Annual Bluegrass (*Poa annua*), as well as five other major annoyances to you and your golfers.

Chipco Ronstar G gets them, and gets them good. For up to 120 days with one application. And it can be a very *early* spring application, precisely because of that long residual. So you can get your men out there before the big work-load hits.

And some more good news. Ronstar G is now available in a new, improved formulation, with larger granules for more even coverage. In addition, research has found you can lower your application rate to 2–4 pounds a.i. per acre, and still get reliable control of Crabgrass and Goosegrass.

Chipco Ronstar G. A welcome addition to the broad Chipco line. For more information, see your distributor or Rhône-Poulenc representative.

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There's nothing like it.

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Golf professionals, golf superintendents and weekend players alike sing the praises of Dixie Green® overseeding mixture. Their reasons are the same: Dixie Green® produces a smooth, true and beautiful putting surface that will last the winter through. Here's what some of the professionals have said about it:

"I mowed 15 days after sowing Dixie Green® and was on my way to the prettiest putting surface I have ever seen." Bob Martin, Superintendent Clarksdale Country Club, Clarksdale, Mississippi.

"Dixie Green® has given me a uniform, dense putting surface that has putted consistently true. The color has been outstanding . . . even though the temperature in January dropped to 11 degrees F. Bent greens went off color . . . but Dixie Green® came through like a champ." Ed O'Donnell, Superintendent Brook Valley Golf & Country Club, Greenville, North Carolina.

Dixie Green® overseeding mixture is a premier mix of Highlight Chewings-type red fescue which was judged World Champion at the 45th Annual Royal Agricultural Show in Toronto, and Derby turf-type perennial ryegrass. This fine mix has proven a winner for winterseeding of greens, tees and aprons all over the South. Dixie Green®—a great mixture for you and your members.

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PRODUCTS

Life-Time Products offers an elevating platform trailer capable of hauling two tons of cargo over the highway. The platform hydraulically lowers completely to the ground or can be raised up to 40 inches to accommodate most truck and dock heights. The bed maintains a level plane when raised and lowered, avoiding load damage due to cargo shift. The trailer is designed for one-man loading and unloading of heavy items.

The unit can be pulled by a properly equipped pickup truck and is furnished with standard equipment such as battery-operated hydraulic pump, electric brakes, DOT lights and reflectors, safety chains and ball type hitch for over-the-highway use.

Various cargo boxes, livestock racks, and stake sides are available as optional equipment. Inquiries on custom application are also accepted.

Circle 701 on free information card

ZZZ-CUT has been introduced by Products for Energy Inc. as an all-in-one line clearance system. It features a four-wheel drive, all-terrain prime mover; a boom-mounted, hydraulic power saw; and a hydraulic rotary cutter to undercut underbrush.

The telescoping boom reaches 50 feet and swings 360 degrees with a joy stick control. The ZZZ-CUT power saw can sever a 7-inch limb in two seconds.

Power includes a Chrysler slant-six industrial gasoline engine or John Deere Diesel and a four-speed synchro-mech transmission for a cruising speed of 45 mph. Off-the-road, ZZZ-CUT switches from 2-wheel to 4-wheel-drive. A special hydrostatic drive puts an infinite range of speeds between zero and four mph without using a clutch.

All wheels are controlled with

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Royer equipment... a selection guide for grounds maintenance superintendents

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WOODSMAN LAND CLEARING MACHINES clear acres a day to ground level. Reduce dense brush, trees to mulch...discharge downward. Self-powered model for dozers, loaders; PTO drives for tractors, Unimogs.

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BRUSH CHIPPERS for high performance, low maintenance. Feature self-feeding anvil with one-piece chipping rotor-flywheel-blower..."swing-away" blade access. Self-powered and PTO tractor models.

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HIGH CAPACITY SHREDDERS for processing topsoil, composted leaves, air-dried sewage sludge. Feature continuous shredding, mixing, aerating, trash-oversize removal. Capacities to 125 cu. yds./hr.

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POWERSCREENS for preparing superfine top dressing mixes. Powered vibrating screen with elevating conveyor for direct truck-loading, stockpiling. Choice of gas or electric drive. Two models.

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full power steering, making it possible to weave in and out of 8-foot openings, turn through a 9-foot inside radius or slip under a 10'6" clearance.

ZZZ-CUT has four axle blocks to lock the wheels plus four individually-controlled outriggers for stability. Options include a fiberglas bucket to mount on the boom inplace of the power say, or a steel work platform.

Circle 702 on free information card

The Hefty Grade-All is a new compact grader introduced by the Hefty Tractor Company. It features an economical 27-horsepower gasoline or optional diesel engine and an all-gear transmission with six forward speeds and one reverse.

Standard equipment includes a hydraulically controlled, multi-function grader blade, power steering, and front weights.

Available options include a front-mounted, dozer blade-scarifier assembly; rear-mounted blade with angle, tilt and offset capacity; snow plow; warning lights; R.O.P.S. bar; mid-mounted rotary and flail mowers.

Circle 703 on free information card

The 1979 Swinger 200 has been introduced by Dynamic Industries. Designed with an SAE operating capacity of 2005 pounds, the Swinger 200 is powered by a water-cooled, 52 (SAE Net) horsepower gasoline engine with an optional diesel engine offered.

Features include a 20-degree front-rear frame oscillation, four-wheel hydrostatic drive and 80-degree articulated steering. Controls

Working 2 Shifts.

Whether it's in open sun or moderate shade, Glade Kentucky bluegrass produces beautiful lawns.

Under trees, beside buildings, in up to 60% shade Glade produces deep green turf; has a higher level of resistance to most races of powdery mildew, stripe smut and leaf rust.

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Specify Glade Kentucky bluegrass, available at your local wholesale seed distributor. It works 2 shifts, sun and shade.

Glade

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Another fine, quality-controlled product of Jacklin Seed Company.

Funding the future

Professor H. B. Musser has made an investment in the future. He is the developer of Penncross Bentgrass, Pennlawn Fescue, author of the book *Turfgrass Management*, and a noted educator.

Professor H. B. Musser devoted his career to grass seed research. As a tribute to this outstanding Pennsylvania State University Turf Seed Agronomist, the Musser Foundation was formed.

The foundation's purpose is to assist graduate students in turf research through a fellowship program. This means students who have finished their undergraduate work and are going into turf research may receive financial assistance at this critical point in their careers. Only the interest earned from the H. B. Musser Fund will be used for fellowships, so the dollars you contribute keep on working in perpetuity.

If you or your company are involved in the sale or use of turfgrass or turfgrass-associated products or services, there's no better way to help yourself and the future of the turf industry than an annual contribution to the Musser Foundation.

Contributions may be made in the name of a loved one through the Memorial Fund, or to the Turfgrass Research Fellowship Fund.

"A fellowship involves an exceptional graduate student doing needed research, writing a thesis, adding to turfgrass literature and providing leadership for the future."

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consist of a standard steering wheel and two foot pedals. Convenient right-hand levers control all bucket lift and tilt functions.

Other models with SAE operating capacities of 1251 pounds and 3012 pounds, and a complete line of rough terrain lift trucks are also available.

Circle 704 on free information card

Rokor has introduced two models of tree diggers and is working on a third. Model TD-32 will dig up to a 3-inch diameter tree with a 32-inch ball. Model TD-40 will dig up to a 4-inch tree with a 40-inch ball. Model TD-54, when introduced, will dig up to a 6-inch tree with a 54-inch ball.

Model TD-32 weighs 1070 pounds and will dig a 28-inch deep, 420 pound ball. It measures 71½ inches across and will set or dig trees within 36 inches of walls or fences. It is designed so that the opened frame is the same width as when closed.

Stem supports are gusseted for extra strength. The stems slide over pins instead of on tracks or stem guides for smoother, positive blade insertions. Blades are offered with a choice of pointed, for sandy soils, or frustrum for clay soils.

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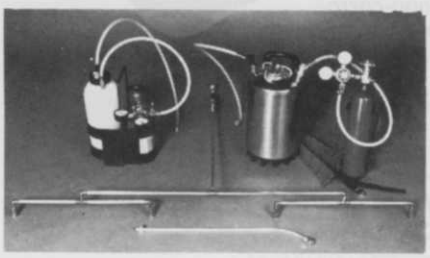


R&D Sprayers have designed two models of hand-held sprayers that can distribute chemical with accuracy in small plot work, parks, golf courses, and areas where large equipment is prohibited.

The sprayers are light-weight, non-corrosive and are available with one- or three-gallon containers. The sprayers are equipped with CO_2 cylinders and feature all aluminum, multi-nozzle spray booms. A single-nozzle spray boom is available for band or directed application.

An operations manual is included which defines calibration and has charts showing quantity of formulated product required per gallon of spray solution based on total spray per acre, recommended rate and product formulation.

Circle 706 on free information card

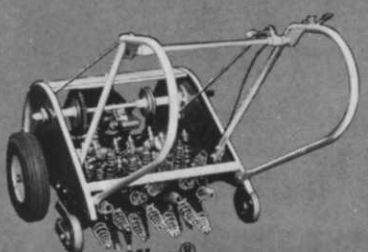
Pinto Reclamation Mixtures of grass seed have been introduced by Lofts Pedigreed Seed and Jacklin Seed Company. The mixtures are specially formulated for use in the reclamation and restoration of land in areas where it is extremely difficult to grow grasses.

Four Pinto brand mixtures are

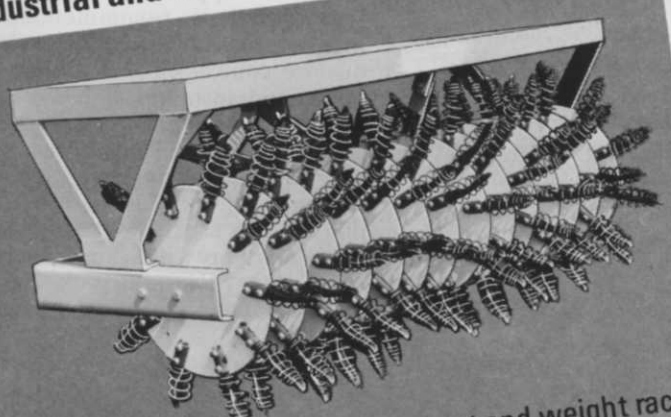
Hahn

THE TURF PROFESSIONALS

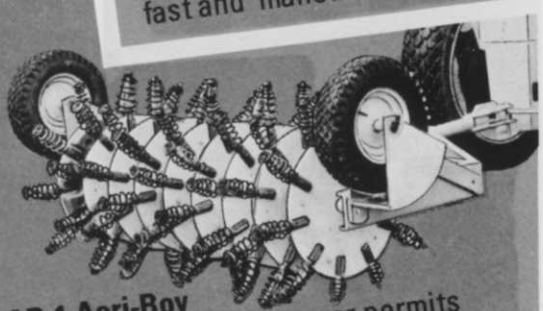
A complete line of Aerifiers for fairways, athletic fields, industrial and institutional lawns . . . at prices you will like!



JR-3 Aerifier®
2 ft. swath. Self-propelled, fast and maneuverable.



TM-140
6 ft. swath. Three-point hitch mount and weight rack. Also available with wheels and hydraulic lift.



AB-1 Aeri-Boy
4 ft. swath. Simple flip-over permits quick transport.

Optional Spoons and Blades for double utility.
Also available — a complete line of Thatchers.

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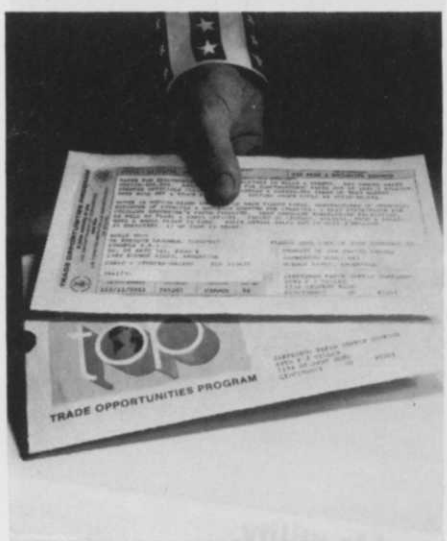

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available, each formulated for specific combination of soil pH and moisture: Dry Acid Mixture; Moist Acid Mixture; Dry Alkaline Mixture; and Moist Alkaline Mixture. All will adapt in areas from coast to coast where cool season grasses are grown.

Pinto Reclamation Mixtures were formulated for such applications as the revegetation or reclamation of fire-damaged areas, strip mines, highway, ski trails and similar projects. The mixtures can be applied with any hydroseeder or conventional seeding equipment.

A Pinto brand Wildflower Seed Mixture is also available to add color or enhance any "back to nature" area.

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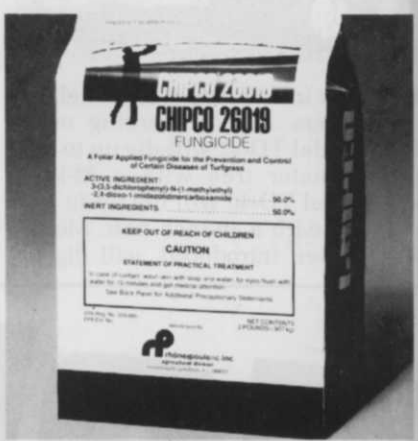

Chipco 26019, a new turf fungicide with a 14-21 day spray interval, has been registered by EPA, according to the Agricultural Division of Rhone Poulenc Inc.

Foliar applied, Chipco 26019 (Iprodione) is recommended for preventative and curative turfgrass disease control on golf courses, sod farms and institutional areas where fine turf is grown. It is registered for control of dollar spot, brown patch and Helminthosporium, leafspot, and melting out. Testing has shown that Chipco 260219 will also control the benomyl resistant strain of dollar spot, according to Jack Davies, general manager of the Agricultural Division.

The fungicide is applied at rates of .75 to 1.0 ounce of active ingredient (AI) per 1000 square feet (M) to control dollar spot and brown patch, and 1.0 ounce AI/M to control Helminthosporium.

Chipco 26019 is formulated as a 50 percent wettable powder (WP) and is available in two pound bags packed six to a carton.

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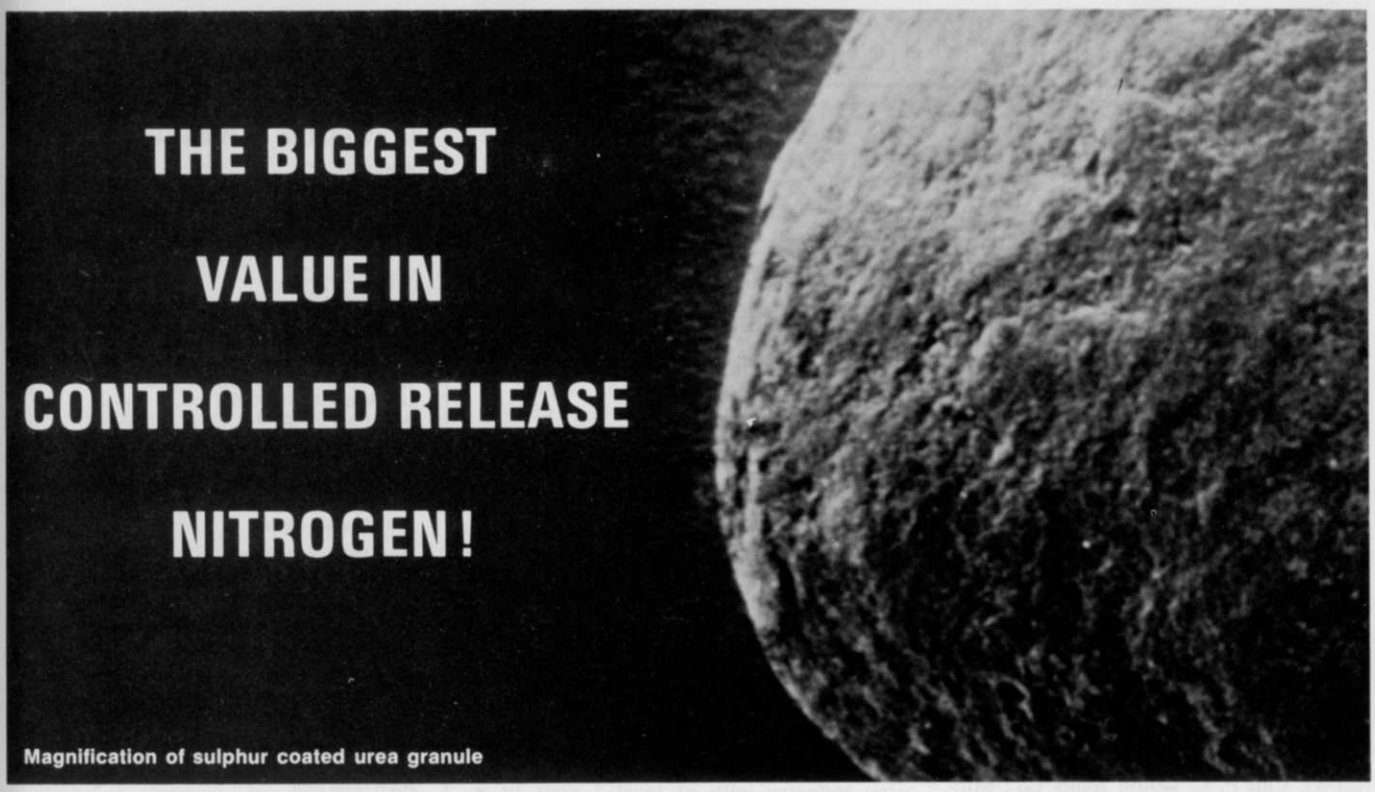

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CLASSIFIEDS

When answering ads where box number only is given, please address as follows: Box number, c/o Weeds Trees and Turf, Dorothy Lowe, Box 6951, Cleveland, Ohio 44101.

Rates: All classifications 65¢ per word. Box number, $1. All classified ads must be received by Publisher the 5th of the month preceding publication date and be accompanied by cash or money order covering full payment. Mail ad copy to: Dorothy Lowe, Weeds, Trees & Turf, P.O. Box 6951, Cleveland, Ohio 44101.

USED EQUIPMENT

2 — 50' AERIAL BASKETS, brush chipper, stump cutter, 2 sprayers, small crane. Parkway Tree Service, 12026 West Cherry St., Wauwatosa, Wisconsin 53226. 414 257-1555.

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Continues on page 100

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Attn: Robert Scobee

The Dalton's Incorporated
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Suite 10000
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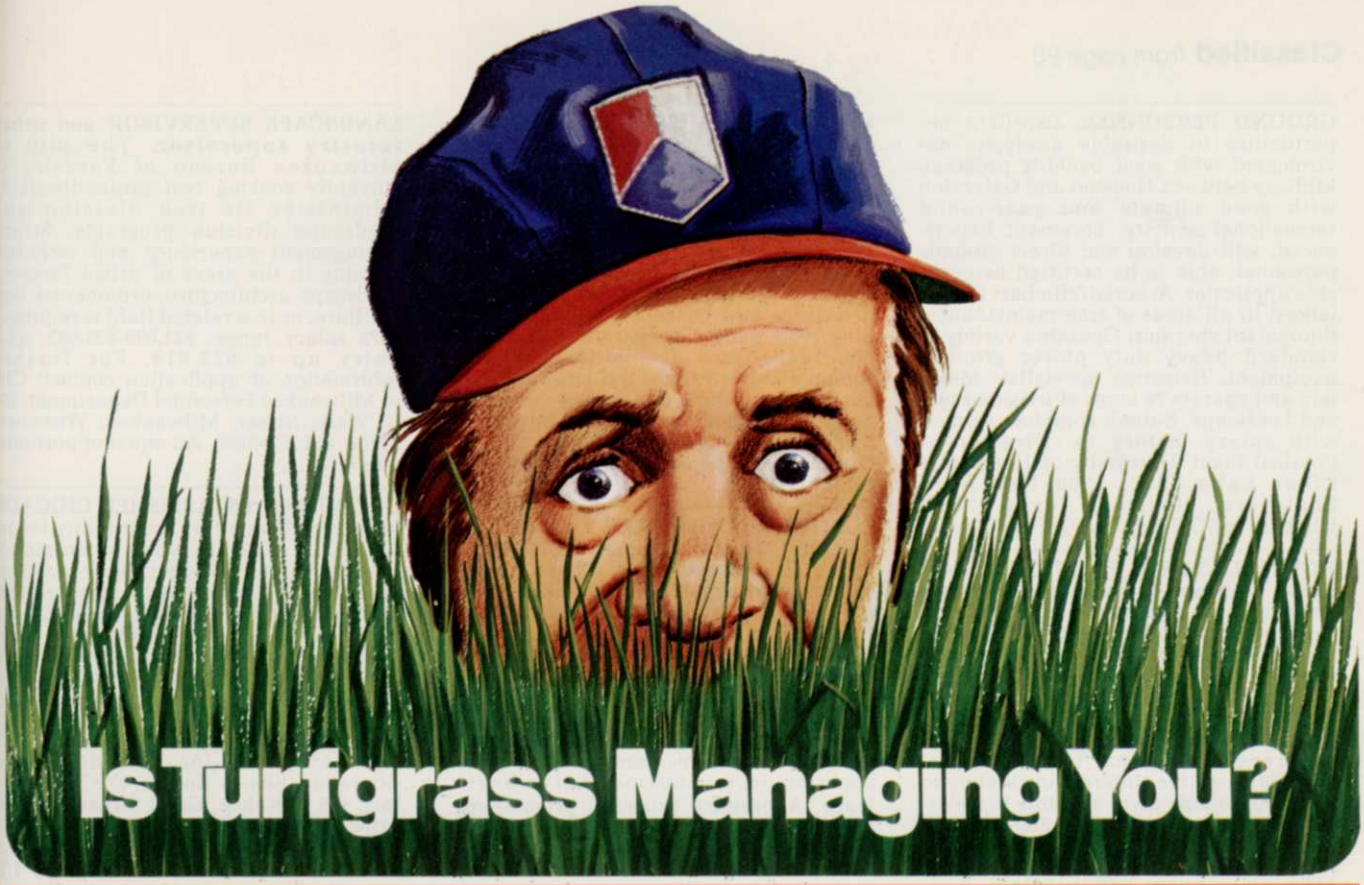

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HORTICULTURE FACULTY Asst./Assoc. professor to teach intro., to plant Science, soil conservation, plant propagation, arboriculture in new facilities. Qualifications: Master's degree in plant science is minimum plus four years practical field experience in at least two of the following areas. Greenhouse management, nursery management, soils and landscape maintenance. Teaching experience is desirable. Interest in relating to two year college level students is necessary. Hiring range: $12,500-$17,000. Closing date for applications: April 30, 1979. Send resumes to Willard T. Keane, Affirmative Action Office, SUNY, Agricultural and Technical College, Delhi, New York, 13753. An equal opportunity/affirmative action employer.

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Continues on page 103

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SEMCO GRAVE DIGGING MACHINE. Used, in good condition. Buyer must provide one year warranty. Write Box 55136, Coon Rapids, Mn. 55433.

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BECK BIG ROLL sod harvester, any condition. Call collect 716 343-2828.

USED CHIPPERS and stump grinders must be reasonable. Cooper Foster Tree Farm, 3190 Cooper Foster, Vermilion, Ohio 44089. 216 967-6750.

WANTED: Hydro seeder, 800 gallon or larger. Len K. Furma, 1305 Alabama, Ames, Iowa 50010. 515 292-3349.

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WANTED: Ryan Jr sod cutter. 201 363-8153 before 8 a.m.

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NEW PRINCETON TOW boy sod harvester, $9,900.00. Jerry Bellini, 302 478-2660. Wilmington, DE.

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ALABAMA SOD FARM. Variety lawn grasses. 125 acres with underground irrigation system. 7 acre reservoir includes bonus of fish. 60 acres currently under production 4 types grass; another 50 planted or sprigged. Good 5 room and bath home, paneled throughout; 50 ft. equipment shed. Pecan trees, fig, and you'll have your own bee tree. 2 drilled wells. Irrigation pumps, motors included. Owner retires; you get the value. $250,000, excellent terms by owner. Strout Realty, P.O. Box 6, Andalusia, Alabama 36420. 205 222-4681.

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Michigan State Students Honored at Conference

Gary Carls (left) received the Michigan Turfgrass Foundation's (MTF) Norman W. Kramer Outstanding Scholar Award. Carls is a two-year student at Michigan State University (MSU). **Patrick Klein** (center), also a two-year student at MSU received the MTF's Outstanding Student Award. **Thomas Smith** (right), received the Burt Bradshaw Outstanding Student Award. Smith is a four-year student at MSU.

Left: **Ron Juip** presents a check from the Michigan Sod Producers Association to **Gordon LaFontaine,** president of MTF, for support of turfgrass research at MSU. Below: **Alan Nielsen** (left) and **Steven Brown** (right) received the Upjohn Company Scholarship Awards from **Robert Yarborough,** the area sales representative. Nielsen is a two-year turf management student at MSU and Brown is a four-year student.

James Sparling, two-year turf management student at MSU, is presented with a GCSAA scholarship by **Ted Woehrle,** past president of that organization.

STOP

Before you do anything to your lawn this spring, the following should be of interest and great help:

NATURE'S METHOD produces → THE GREEN MAGIC SYSTEM

TO REINFORCE WHAT YOU ALREADY KNOW...

1. Nature has a method and a rhythm that makes plants (lawns) grow healthfully & beautifully.

2. Man has a distinctive ability that quickly destroys Nature's positive responses. For instance, it is common knowledge that:

   A. Chemical fertilizers create lush growth and make the plants more susceptible to infestations of insects, diseases and other undesirables — plus reduce the plants ability to withstand unfavorable weather and environmental conditions (heat, cold, drought, excessive wet spells, etc.)

   B. Continual applications of chemicals and pesticides kill the beneficial soil bacteria that decompose Mat and Thatch which convert this accumulation into the necessary organic matter (humus) that builds a more productive soil. Stopping this natural beneficial process creates excessive Mat & Thatch accumulation that makes an ideal media for fungus disease and insect growth that quickly invade and weaken the grass.

   C. Misapplications and applications of the wrong products destroy the soil, make the soil more compact, so compact that air, water and nutrients cannot penetrate, causing short shallow root growth of desirable grasses making the grass weak and unable to cope with undesirable conditions and unable to heal from the wounds.

   D. The list is endless . . .

YOU CAN STOP THESE AND OTHER DESTRUCTIVE ACTIONS by converting your operations into a more simplified and exacting program that will produce better and more beautiful results with the assistance of Nature.

Agro Chem's GREEN MAGIC SYSTEM is NATURAL and far more exact than anything you have done to date and anything that is currently available to you.

LEARN HOW YOU CAN BENEFIT FROM NATURE.

Call or write us today for complete literature and details of how you can start working with nature.

This program is ideal for Large and Small Lawn area Managers and is The Most Complete Program for companies offering lawn spray services to residential and commercial firms.

Programs and packages are available for all types of lawn areas. Dealerships are available for custom spray operators.

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- 1—250' light weight pressure hose
- 1—Electric hose reel
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- 1—Lawn gun with assorted nozzels
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- 1 each—Suction & Bi-pass hose
- 1—Root feeder

This basic spray rig is designed to fit in a pick-up truck, the tank situated between the rear wheel well and cab of truck. The motor, pump and hose reel on the right side leaving the remainder of the truck bed for other equipment and supplies.

Van pictured shows the basic spray unit in the van, leaving the entire rear area for storage of products.

As you will see, these sprayer units have been designed with a great deal of thought, research, and years of experience. They are designed and built by professionals, for professionals. For more details, either call or write Mr. Joseph.

This basic 300 gallon unit can be expanded to whatever size spray rig desired by simply adding more tanks — eliminates purchasing new equipment as business expands.

Pictured:
16' Flat bed truck carrying 5 — 300 gal. tanks + 1500 gals.

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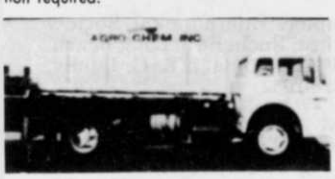

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EVENTS

Spray Adjuvant Workshop, Hopkins Agricultural Chemical Co., Holiday Inn - West, Columbia, Mo., **April 1.** Phone: 608/222-0624.

Williamsburg Garden Symposium, Williamsburg Conference Center, Williamsburg, Vir., **Apr. 1-4.** Contact: Mrs. Peggy Sabol, Registrar, The Williamsburg Garden Symposium, P.O. Drawer C., Williamsburg, VA 23185, phone: 804/229-1000, ext. 2370.

Spray Adjuvant Workshop, Hopkins Agricultural Chemical Co., Holiday Inn, Burlington, Iowa, **April 2.** Phone 608/222-0624.

Municipal Tree Inspector Workshop, Grand Rapids, Mich., **April 4.** Contact: Agricultural Extension Service, University of Minnesota, St. Paul, MN 55108, 612/373-0725.

First Annual Meeting of the Lawn and Garden Manufacturers Association, Sheraton O'Hare Hotel, Chicago, **April 8-10.** Contact: Stuart Greenblatt, LAGMA, One Illinois Center, 111 E. Wacker Dr., Chicago, IL 60601, 312/644-6610.

33rd Annual Southeastern Turfgrass Conference, Georgia Costal Plains Station and Rural Development Center, Tifton, Ga., **April 9-10.** Contact: Clara Wheeler, P.O. Box 748, Tifton, GA 31794.

Development of Recreation Areas Conference, Snowbird Village, Snowbird, Utah, **April 18-21.** Contact: The American Socity of Civil Engineers, 345 47th St., New York, NY 10017, 212/644-7671.

Southern California Turf and Landscape Institute, Convention Center, Anaheim, **April 18-19.** Contact: Ed McNeill, 1000 Concha St., Altadena, CA 91001, 213/798-1715.

1979 Arizona Turfgrass Conference, Tucson, Arix., **May 9-10.** Contact: Prof. William Kneebone, The University of Arizona, College of Agriculture, Department of Plant Sciences, Tucson, AR 85721.

A Symposium on Turfgrass Diseases, Ohio State University, OARDC, & Chemlawn Corp., University Holiday Inn, Columbus, Ohio, **May 15-17.** Write: A Symposium of Turfgrass Diseases 1979, 2865 E. Orange Rd., Galena, OH 43021, or phone: Dr. P. O. Larsen, 614/422-6987, or Dr. B. G. Joyner, 614/885-9588.

Western Chapter, International Society of Arboriculture, Rochelle's, Long Beach, Calif., **May 17-18.** Contact: E. C. Bundy, phone: 217/328-2032.

Texas A&M University Turfgrass Research Field Day, TAMU Turfgrass Field Lab, Agronomy Road, TAMU Campus, College Station, Tex., **May 24.** Contact: Dr. Richard Duble or James Beard, Department of Soil and Crop Sciences, Texas A&M University, College Station, TX 77843.

The current issue of WEEDS TREES & TURF carries meeting dates beginning with the following month. To insure that your event is included, please forward it, 90 days in advance, to: WEEDS TREES & TURF Events, 9800 Detroit Ave., Cleveland, OH 44102.

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Arnold Palmer discusses his overseeding program at Bay Hill with Peter Loft.

Note: The Bay Hill Club and Lodge will host the Florida Citrus Golf Classic.